



United States Environmental Protection Agency  
Washington, DC 20460

## Completion Form For Injection Wells

### Administrative Information

1. Permittee

Florence Copper Inc.

Address (Permanent Mailing Address) (Street, City, and ZIP Code)

1575 W Hunt Hwy, Florence, AZ 85132

2. Operator

Florence Copper Inc.

Address (Street, City, State and ZIP Code)

1575 W Hunt Hwy, Florence, AZ 85132

3. Facility Name

Florence Copper Inc.

Telephone Number

(520) 374-3984

Address (Street, City, State and ZIP Code)

1575 W Hunt Hwy, Florence, AZ 85132

### 4. Surface Location Description of Injection Well(s)

State

Arizona

County

Pinal

#### Surface Location Description

Nw 1/4 of SW 1/4 of NE 1/4 of SW 1/4 of Section 28 Township 4S Range 9E

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface

Location 178 ft. from (N/S) N Line of quarter section

and 139 ft. from (E/W) E Line of quarter section.

#### Well Activity

☐ Class I☐ Class II☐ Brine Disposal☐ Enhanced Recovery☐ Hydrocarbon Storage☒ Class III☐ Other

#### Well Status

☒ Operating☐ Modification/Conversion☐ Proposed

#### Type of Permit

☐ Individual☒ Area : Number of Wells 33

Lease Number NA

Well Number MW-01-LBF

Submit with this Completion Form the attachments listed in Attachments for Completion Form.

### Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment (Ref. 40 CFR 144.32)

Name and Official Title (Please type or print)

Ian Ream, Senior Hydrogeologist

Signature

Date Signed

9-12-2018

## PAPERWORK REDUCTION ACT

The public reporting and record keeping burden for this collection of information is estimated to average 49 hours per response for a Class I hazardous facility, and 47 hours per response for a Class I non-hazardous facility. Burden means the total time, effort, or financial resource expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal Agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to the collection of information; search data sources; complete and review the collection of information; and, transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including the use of automated collection techniques to Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed forms to this address.

### Attachments to be submitted with the Completion report:

#### I. Geologic Information

##### 1. Lithology and Stratigraphy

A. Provide a geologic description of the rock units penetrated by name, age, depth, thickness, and lithology of each rock unit penetrated.

B. Provide a description of the injection unit.

- (1) Name
- (2) Depth (drilled)
- (3) Thickness
- (4) Formation fluid pressure
- (5) Age of unit
- (6) Porosity (avg.)
- (7) Permeability
- (8) Bottom hole temperature
- (9) Lithology
- (10) Bottom hold pressure
- (11) Fracture pressure

C. Provide chemical characteristics of formation fluid (attach chemical analysis).

D. Provide a description of freshwater aquifers.

- (1) Depth to base of fresh water (less than 10,000 mg/l TDS).
- (2) Provide a geologic description of aquifer units with name, age, depth, thickness, lithology, and average total dissolved solids.

#### II. Well Design and Construction

1. Provide data on surface, intermediate, and long string casing and tubing. Data must include material, size, weight, grade, and depth set.
2. Provide data on the well cement, such as type/class, additives, amount, and method of emplacement.
3. Provide packer data on the packer (if used) such as type, name and model, setting depth, and type of annular fluid used.

4. Provide data on centralizers to include number, type and depth.

5. Provide data on bottom hole completions.

6. Provide data on well stimulation used.

#### III. Description of Surface Equipment

1. Provide data and a sketch of holding tanks, flow lines, filters, and injection pump.

#### IV. Monitoring Systems

1. Provide data on recording and nonrecording injection pressure gauges, casing-tubing annulus pressure gauges, injection rate meters, temperature meters, and other meters or gauges.

2. Provide data on constructed monitor wells such as location, depth, casing diameter, method of cementing, etc.

#### V. Logging and Testing Results

Provide a descriptive report interpreting the results of geophysical logs and other tests. Include a description and data on deviation checks run during drilling.

VI. Provide an as-built diagrammatic sketch of the injection well(s) showing casing, cement, tubing, packer, etc., with proper setting depths. The sketch should include well head and gauges.

VII. Provide data demonstrating mechanical integrity pursuant to 40 CFR 146.08.

VIII. Report on the compatibility of injected wastes with fluids and minerals in both the injection zone and the confining zone.

IX. Report the status of corrective action on defective wells in the area of review.

X. Include the anticipated maximum pressure and flow rate at which injection will operate.

**TECHNICAL MEMORANDUM**

17 September 2018  
File No. 129687-010

TO: Florence Copper Inc.  
Ian Ream, Senior Hydrogeologist

FROM: Haley & Aldrich, Inc.  
Lauren Candreva, R.G.

Subject: Drilling, Installation, and Integrity Testing Summary  
PTF Operational Monitoring Well MW-01-LBF  
Florence Copper Inc., Florence, Arizona



This document summarizes the drilling, installation, and testing of Production Test Facility (PTF) operational monitoring well MW-01-LBF for Florence Copper Inc. (Florence Copper) in Florence, Arizona, including the equipment used to perform the work, completion, and the results of well testing activities. Separate well completion reports have been created for each PTF well.

The Arizona Department of Water Resources Registry ID for well MW-01-LBF is 55-226789; the Well Registry Report is included in Appendix A. The well is located in the southeast quarter of the northwest quarter of the southwest quarter of Section 28 of Township 4 south, Range 9 East of the Gila and Salt River Baseline and Meridian (D(4-9)28CBD). The well is located within the Underground Injection Control (UIC) Permitted Area of Review (AOR) for UIC Permit R9UIC-AZ3-FY11-1 and was completed as a Class III operational monitoring well for the PTF (Figure 1).

Florence Copper contracted Stewart Brothers to drill, install, and test well MW-01-LBF in accordance with *Bid Specification: Installation, of Class III Monitoring Wells, Production Test Facility, Florence, Arizona* (Haley & Aldrich, Inc. [Haley & Aldrich], 2015). An Atlas Copco RD-20 drilling rig was used for all drilling and construction activities. Haley & Aldrich provided intermittent oversight of drilling activities and provided complete oversight during key activities such as geophysical logging, well installation, and testing. All reported depths are in feet below ground surface unless otherwise noted.

## I. Geologic Information

### 1. Lithology and Stratigraphy

#### A. Geology of Penetrated Units

The geology penetrated during the drilling of the Class III well MW-01-LBF is summarized below and a lithologic log is included in Appendix B.

Lithologic Unit Name	Depth to Bottom of Unit (feet)	Thickness of Unit (feet)	Lithology and Age of Unit
Upper Basin Fill Unit (UBFU)	280	280	Alluvium; Quaternary to Tertiary
Middle Fine-Grained Unit (MFGU)	299	19	Alluvium; Tertiary
Lower Basin Fill Unit (LBFU)	Not encountered	>146	Alluvium; Tertiary to Cretaceous
Bedrock Oxide Unit (Oxide)	Not encountered	Not encountered	Igneous porphyry; Precambrian

#### B. Description of Injection Unit

Well MW-01-LBF is an operational monitoring well completed in the LBFU; the bottom of the well is above the top of the permitted injection zone.

#### C. Chemical Characteristics of Formation Fluid

The chemical characteristics of the formation fluid in the injection zone are summarized below and are the sampling results from the center PTF wellfield well, R-09. The table below summarizes the primary chemical characteristics detected in a formation fluid sample collected on 23 April 2018; the complete analytical report is included in Appendix C.

Analyte	Result (mg/L)
<b>Metals</b>	
Aluminum	<0.08
Antimony	<0.005
Arsenic	0.0016
Barium	0.071
Beryllium	<0.0005
Cadmium	<0.00025
Calcium	140
Chromium	0.0051
Cobalt	<0.00025
Copper	0.011
Iron	<0.30
Lead	<0.0005
Magnesium	27
Manganese	0.002



Analyte	Result (mg/L)
Mercury	<0.001
Nickel	0.0033
Potassium	6.8
Selenium	<0.0025
Sodium	170
Thallium	<0.0005
Zinc	<0.04
<b>Anions</b>	
Bicarbonate	150
Chloride	310
Fluoride	<0.5
Nitrate	8.8
Sulfate	190
<b>Field Parameters</b>	
Total Dissolved Solids	1,000
pH	7.8
<b>Radiochemicals</b>	
Uranium	0.016
<b>Notes:</b> mg/L = milligrams per liter	

Water quality of each PTF monitoring well, including well MW-01-LBF, is summarized in *Procedures for Determining Alert Levels and Aquifer Quality Limits for Groundwater Compliance Monitoring* (Brown and Caldwell, 2018).

#### D. Description of Freshwater Aquifers

- 1) The depth to the base of the freshwater aquifer is defined by the interface where deeper formation fluid exhibits a total dissolved solids (TDS) value of 10,000 milligrams per liter (mg/L). The depth of the 10,000 mg/L interface is deeper than all of the wells drilled at the site and consequently has not been defined.
- 2) A geologic description of the aquifer units is included below:

Aquifer Unit Name	Age	Depth (feet)	Thickness (feet)	Lithology	Average Total Dissolved Solids <sup>1</sup> (mg/L)
UBFU	Quaternary/Tertiary	0 to 280	280	Alluvium	914
LBFU	Tertiary	Not encountered	Not encountered	Alluvium	754

<sup>1</sup> Average TDS values calculated from UBFU and LBFU monitoring well ambient monitoring results near the PTF.

## II. Well Design and Construction

### 1. Well MW-01-LBF Casing Installed

Casing	Material	Diameter (inches)	Weight (pounds per foot)	Depth (feet)	Borehole Diameter (inches)	Drilling Method
Surface	Mild steel	14 O.D. 13 $\frac{3}{8}$ I.D.	47.36	0 to 40	17 $\frac{1}{2}$	Conventional mud rotary
Well casing	Mild steel	5.66 O.D. 5.14 I.D.	5.40	-2.1 to 330	10 $\frac{5}{8}$	Conventional mud rotary
Screen	PVC Sch. 80 with 0.020-inch wide slots	5.56 O.D. 4.81 I.D.	4.08	330 to 440	10 $\frac{5}{8}$	Conventional mud rotary
<b>Notes:</b> <i>I.D.</i> = inside diameter <i>O.D.</i> = outside diameter <i>PVC</i> = polyvinyl chloride <i>Sch.</i> = Schedule						

### 2. Well Cement

Cement Interval	Cement Type	Additives	Amount Installed (cubic yards)	Method of Emplacement
Surface casing	Type V Neat 21 sack slurry	None	1	Submerged tremie
Well casing	Type V Neat 21 sack slurry	None	8	Submerged tremie

Field forms documenting pipe tallies, annular materials, and cement tickets are included in Appendix D.

### 3. Annular Packers

No annular packers were used during construction of well MW-01-LBF.

### 4. Centralizers

Casing	Centralizer Type	Number and Spacing
Well – FRP and PVC	Stainless steel – heavy duty	10 installed – every 40 feet
<b>Notes:</b> <i>FRP</i> = fiberglass reinforced plastic <i>PVC</i> = polyvinyl chloride		

5. Bottom Hole Completion

There is no bottom hole completion, as this is not an oil/gas well. The well was completed at the bottom with a stainless-steel endcap of the same diameter as the well screen.

6. Well Stimulation

No well stimulation was used during the drilling and construction of well MW-01-LBF.

### III. Description of Surface Equipment

1. Surface Equipment

Well MW-01-LBF is an operational monitoring well and has been equipped with a pressure transducer for monitoring water levels and a low-flow pump for collecting water quality samples. There is no surface equipment beyond the well casing stick-up and locking well vault. An as-built diagram of the well is included as Figure 2.

### IV. Monitoring Systems

1. Well Monitoring Equipment

Well MW-01-LBF is a monitoring well and does not have any monitoring systems for injection. A pressure transducer with a data logger is installed in the well to collect water levels for compliance reporting.

2. Monitoring Wells

A total of 16 monitoring wells (including MW-01-LBF) are associated with the PTF: 7 point-of-compliance (POC) wells, 7 United States Environmental Protection Agency (USEPA) supplemental monitoring wells, and 2 operational monitoring wells. The POC wells are located outside the AOR and are not constructed as Class III wells. The supplemental monitoring and operational monitoring wells are located within the AOR and are constructed as Class III wells as required by the UIC Permit. The wells are summarized in the tables below by type.

POC Wells						
Well ID	Location X/Y (State Plane NAD 83)	Depth (feet)	Well Nom. Diameter (inches)	Cementing Method	Screened Interval (feet)	Screened Lithologic Unit
M14-GL	846750.23 746461.52	859	5 9/16 OD	Submerged tremie	778 to 838	LBFU
M15-GU	846697.17 746464.82	615	5 9/16 OD	Submerged tremie	554 to 594	LBFU

POC Wells						
Well ID	Location X/Y (State Plane NAD 83)	Depth (feet)	Well Nom. Diameter (inches)	Cementing Method	Screened Interval (feet)	Screened Lithologic Unit
M22-O	846751.26 746514.47	1,140	5 9/16 OD to 528 feet; 4½ OD to 1,140 feet	Submerged tremie	932 to 1,130	Oxide
M23-UBF	846688.13 746512.48	250	6¾ OD	Submerged tremie	210 to 250	UBFU
M52-UBF	851092.00 774178.00	274	5 9/16	Submerged tremie	198 to 273	UBFU
M54-LBF	847331.96 746682.61	630	5 9/16	Submerged tremie	310 to 629	LBFU
M54-O	847342.99 746702.36	1,199	5 9/16	Submerged tremie	668 to 1,198	Oxide
OD = outside diameter						

Supplemental Monitoring Wells						
Well ID	Location X/Y (State Plane NAD 83)	Depth (feet)	Well Nom. Diameter (inches)	Cementing Method	Screened Interval (feet)	Screened Lithologic Unit
M55-UBF	847541.46 746280.63	261	5	Submerged tremie	240 to 260	UBFU
M56-LBF	847518.70 746303.41	340	5	Submerged tremie	320 to 340	LBFU
M57-O	847378.37 746248.93	1,200	5	Submerged tremie	523 to 1,199	Oxide
M58-O	847672.23 746595.97	1,200	5	Submerged tremie	594 to 1,199	Oxide
M59-O	847934.95 746218.89	1,201	5	Submerged tremie	534 to 1,199	Oxide
M60-O	847599.37 745903.70	1,201	5	Submerged tremie	444 to 1,200	Oxide
M61-LBF	848184.46 746148.88	629	5	Submerged tremie	429 to 629	LBFU



Operational Monitoring Wells						
Well ID	Location X/Y (State Plane NAD 83)	Depth (feet)	Well Nom. Diameter (inches)	Cementing Method	Screened Interval	Screened Lithologic Unit
MW-01-LBF	847487.97 746360.54	444	5	Submerged tremie	330 to 440	LBFU
MW-01-O	847499.04 746369.31	1,200	5	Submerged tremie	500 to 1,200	Oxide

## V. Logging and Testing Results

Borehole geophysical logging was conducted on well MW-01-LBF in two phases: 1) open-hole surveys in the 12.25-inch borehole prior to installation of the well casing and screen, and 2) cased-hole surveys in the completed well.

The open-hole geophysical surveys completed at well MW-01-LBF included:

- Spontaneous potential;
- Natural gamma;
- Electrical resistivity (short and long normal);
- Caliper with calculated volume;
- Temperature; and
- Sonic.

The cased-hole geophysical surveys completed included:

- Sonic (for cement bond with fiberglass reinforced plastic [FRP]);
- 4 pi density (for cement bond with FRP);
- Dual density (for cement bond with FRP);
- Natural gamma;
- Fluid conductivity; and
- Temperature.

Open-hole geophysical surveys were used to support identification of the lithologic contacts, to evaluate the condition of the borehole, and to evaluate the deviation of the borehole.

The primary logs used to evaluate lithologic contacts were natural gamma ray, short (16-inch) and long (64-inch) normal electrical resistance, and single-point resistance. The lithologic contacts for the Middle Fine-Grained Unit (MFGU) were selected based on the short and long resistance and the single-point resistance. All the resistivity values decreased and remained consistently low through the MFGU. This contact is generally characterized by a relatively sharp decrease in resistance at the top of the unit and a gradual increase in resistance below the bottom of the unit. The top and bottom of the MFGU in MW-01-LBF are 280 and 299 feet, respectively.

Cased-hole geophysical surveys were conducted to evaluate the cement seal and the casing-cement bond, to document baseline fluid temperature and conductivity, and to evaluate the plumbness of the well. The cement bond is discussed in Section VII.

Copies of all the geophysical logs are included in Appendix E; a figure summarizing the open-hole logs used to evaluate the geology is included as Figure 3.

## **VI. Well As-Built Diagram**

An as-built diagram for well MW-01-LBF is included as Figure 2.

## **VII. Demonstration of Mechanical Integrity**

A demonstration of Part I mechanical integrity of the well was completed using a standard annular pressure test (SAPT) in accordance with Part II.E.3.a.i.A of the UIC Permit. Mechanical integrity will be demonstrated every 2 years during operations. The SAPT for well MW-01-LBF is summarized below.

The SAPT was conducted by installing an inflatable straddle packer assembly in the well. The bottom packer was installed near the bottom of the FRP-cased portion of the well and the top packer was near the surface; the packers were inflated to form a seal against the casing. The bottom 5 feet of the packer drop pipe was perforated to allow for communication between the tubing and the annulus of the packer assembly. The drop pipe extended through the wellhead and a high pressure/low volume pump was attached to the drop pipe to pressurize the test interval. A valve on the drop pipe at the surface was used to isolate the test interval once the planned test pressure was achieved.

An In-Situ LevelTROLL® pressure transducer with a data logger was installed at the well head and connected to the packer assembly annulus interval via a National Pipe Thread adapter. The LevelTROLL was used to monitor and record pressure inside the well during the SAPT. To conduct the SAPT, water was pumped from a nearby well immediately prior to testing. Before the water was pumped into the test well, the water temperature was measured to ensure that it was similar to the ambient groundwater temperature of the test well to reduce the potential for differential temperature effects on the well casing. The SAPT for the Class III well was conducted by applying hydraulic pressure to the well casing and shutting in pressure between the packer and wellhead assembly, monitoring the shut-in pressure for a 30-minute period, then measuring the volume of water returned from the well casing after the pressure was released.

On 1 February 2018, the packer was installed to approximately 286 feet; the SAPT was unsuccessful. The USEPA SAPT form, a table of the data, and a chart of the data is provided in Appendix F.

Part II mechanical integrity is demonstrated by the cementing records included in this report (in accordance with Part II.E.3.ii.C of the UIC Permit) and will be demonstrated during operations by annular conductivity monitoring on the observation and multi-level sampling wells (in accordance with Part II.E.3.a.ii.A of the UIC Permit).

Cemented Interval	Cement Type	Calculated Grout Volume (cubic yards)	Installed Grout Volume (cubic yards)
Surface casing	Type V 21 sack neat cement slurry	0.9	1
Well casing	Type V 21 sack neat cement slurry	8.8	8

On 31 January 2018, a cement bond log was run over the entire length of the completed well to verify the grout seal. A summary of the logs completed to demonstrate cement bond are included in Appendix G.

The cement bond of the steel casing at well MW-01-LBF was evaluated by the geophysical contractor by calculating a bond index. Due to the limited saturated interval, density logs including focused density and 4pi density logs were also run to evaluate the unsaturated portion of the well. The bond index for well MW-01-LBF was calculated to be greater than 90 percent over the saturated cement grouted interval from approximately 246 to 270 feet. Below 270 feet, there is a decreased bond; however, the density of the annular material remains consistent down to the bottom of the cemented zone at approximately 310 feet. The bond evaluation data is included on the summary log in Appendix G.

## VIII. Compatibility of Injected Waste

The Florence Copper Project is a Class III mineral extraction project and does not include the injection of any waste products of any kind. The injected fluid (lixiviant) is a carefully constituted in-situ copper recovery solution that will be recovered and recycled following injection.

The compatibility of the lixiviant was evaluated as part of the geochemical modeling completed by Florence Copper and summarized in the *Geochemical Evaluation to Forecast Composition of Process Solutions for In-Situ Copper Recovery Pilot Test Facility at Florence Copper, Florence Arizona* (Daniel B. Stephens Inc., 2014) which was included in Attachment H of the UIC Permit Application.

## IX. Status of Corrective Action on Defective Wells in the Area of Review

There are not currently any defective wells in the AOR.

## X. Maximum Pressures and Flow Rates for MW-01-LBF

Maximum Operating Pressure	Maximum Flow
Atmospheric	Not applicable – monitoring well

This well is a monitoring well used to monitor water quality near the PTF. No fluids will be injected.

## XI. Well Development

Well MW-01-LBF was initially developed by the airlift method, followed by pump development. Development activities were completed by Stewart Brothers using the RD-20 drilling rig. On 21 December 2017, an airline was temporarily installed and airlift development of the well was conducted at approximately 10 gallons per minute (gpm) to purge drilling fluids and solids from the well. During airlift development, the airlift pump was turned on and off to surge the well. After 5.5 hours, approximately 1 gallon of AquaClear PFD® polymer dispersant was swabbed into the screened interval of the well. Airlift development was concluded on 23 December 2017.

To pump develop the well, on 28 December 2017 a submersible pump was temporarily installed to a depth of 420 feet. Prior to pumping, the static water level was approximately 230 feet. Pump development was conducted at approximately 60 gpm; the submersible pump was periodically turned off to surge the well during development. Pump development was concluded on 29 December 2017, at which time the discharge was visually clear with turbidity values generally less than 10 Nephelometric Turbidity Units. Well development forms are included in Appendix H.

## XII. Well Completion

A well video survey was conducted on 9 February 2018; the video log report is included in Appendix I. The video log depths are presented in feet below the top of the casing and thus vary slightly from what is recorded; however, these values are the same with the correction for stick up.

The video log indicates that the bottom of the well is at 438 feet.

The surveyed location for well MW-01-LBF is as follows:

Northing (feet)	Easting (feet)	Measuring Point Elevation (feet amsl)
746360.54	847487.97	1478.92
<b>Notes:</b> <i>Northing and easting locations provided in State Plane North American Datum 1983; vertical location provided in North American Vertical Datum 1988. amsl = above mean sea level</i>		



### **XIII. Downhole Equipment**

Permanent equipment installed in well MW-01-LBF includes the following:

- QED® low-flow sampling pump hung on drop tubing (pump at 385 feet); and
- Pressure transducer.

The type and depth of equipment installed in each well is not constrained by the UIC Permit or the Aquifer Protection Permit (APP). This information is provided in accordance with Section 2.7.4.3 of the APP. Operational considerations may require that the type and depth of equipment be changed in response to conditions observed during operations.

### **XIV. References**

Brown and Caldwell, Inc., 2018. *Procedures for Determining Alert Levels and Aquifer Quality Limits for Groundwater Compliance Monitoring, Florence Copper Project, Florence, Arizona*. June.

Daniel B. Stephens, Inc., 2014. *Geochemical Evaluation to Forecast Composition of Process Solutions for In-Situ Copper Recovery Pilot Test Facility at Florence Copper, Florence Arizona*. Prepared for Florence Copper. May.

Haley & Aldrich, Inc., 2017. *Bid Specification: Installation, of Class III Monitoring Wells, Production Test Facility, Florence, Arizona*. Revised September 2017.

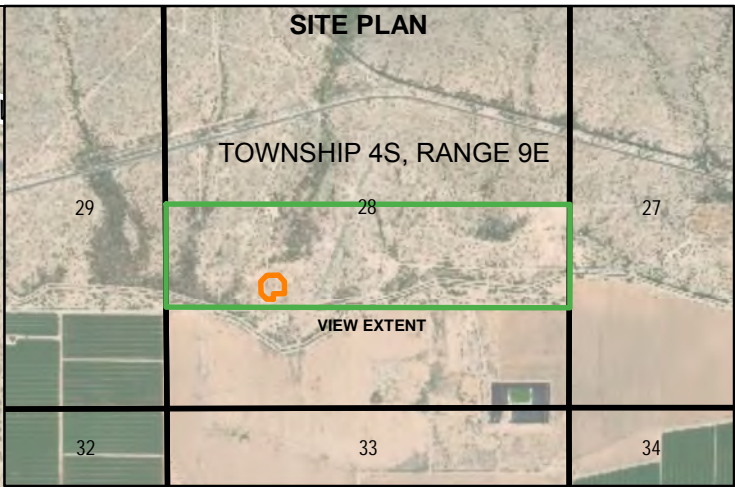
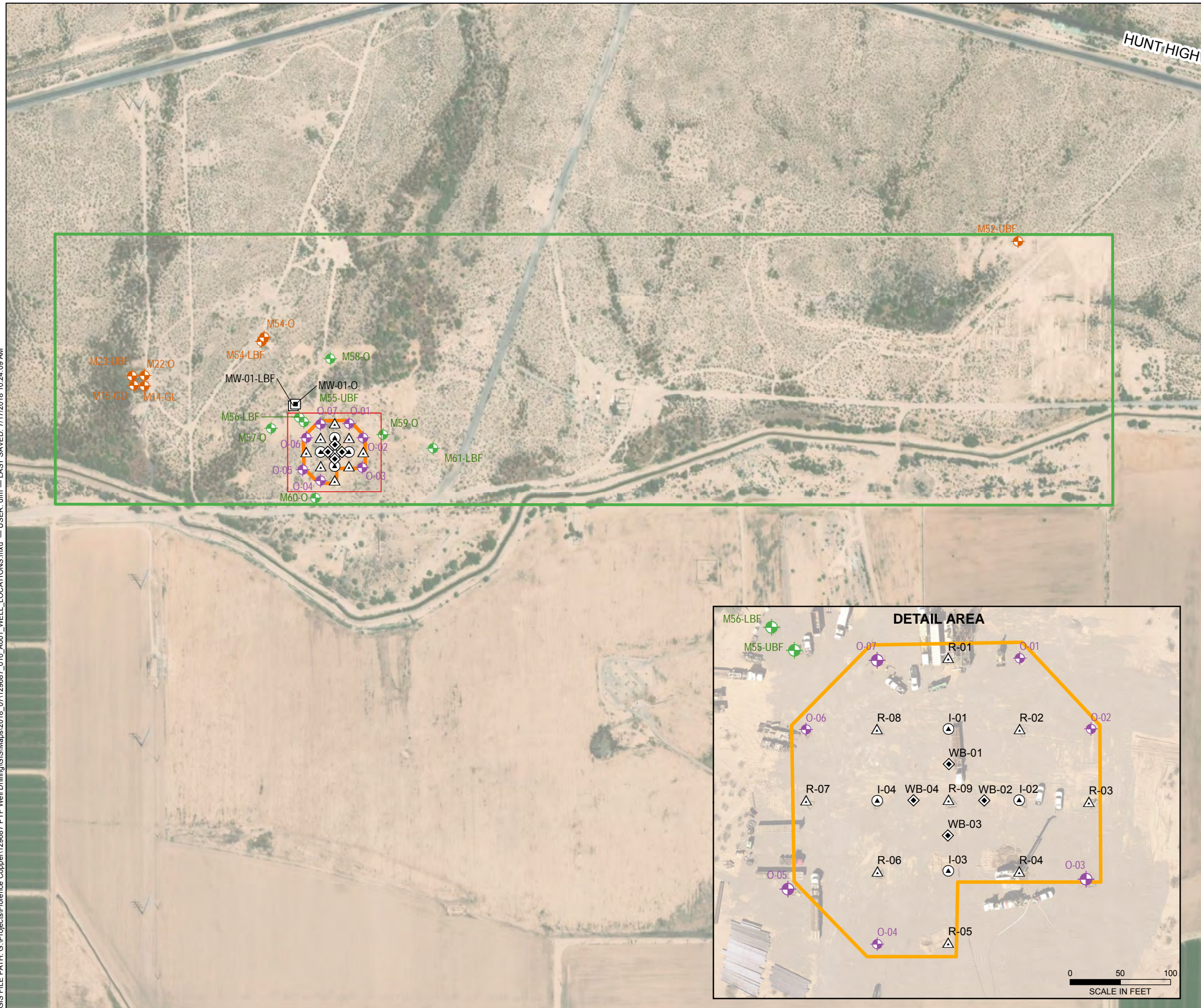
Enclosures:

- Figure 1 – Well Locations
- Figure 2 – Well MW-01-LBF As-Built Diagram
- Figure 3 – Geophysical Data and Lithologic Log
- Appendix A – Arizona Department of Water Resources Well Registry Report
- Appendix B – Lithologic Log
- Appendix C – Chemical Characteristics of Formation Water
- Appendix D – Well Completion Documentation
- Appendix E – Geophysical Logs
- Appendix F – SAPT Documentation
- Appendix G – Cement Bond Log Summary
- Appendix H – Well Development Field Forms
- Appendix I – Well Video Log Report

## FIGURES



GIS FILE PATH: G:\Projects\Florence Copper\129687 PTF Well Drilling\GIS\Maps\2018\_07129687\_010\_A001\_WELL\_LOCATIONS.mxd — USER: dfm — LAST SAVED: 7/17/2018 10:24:09 AM



**LEGEND**

- OBSERVATION WELL
- SUPPLEMENTAL MONITORING WELL
- POINT-OF-COMPLIANCE WELL

**PTF WELL**

- INJECTION
- RECOVERY
- WESTBAY WELL
- OPERATIONAL MONITORING

PTF WELL FIELD

STATE LAND LEASE

**NOTES**

- ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
- AERIAL IMAGERY SOURCE: ESRI

**HALEY  
ALDRICH**

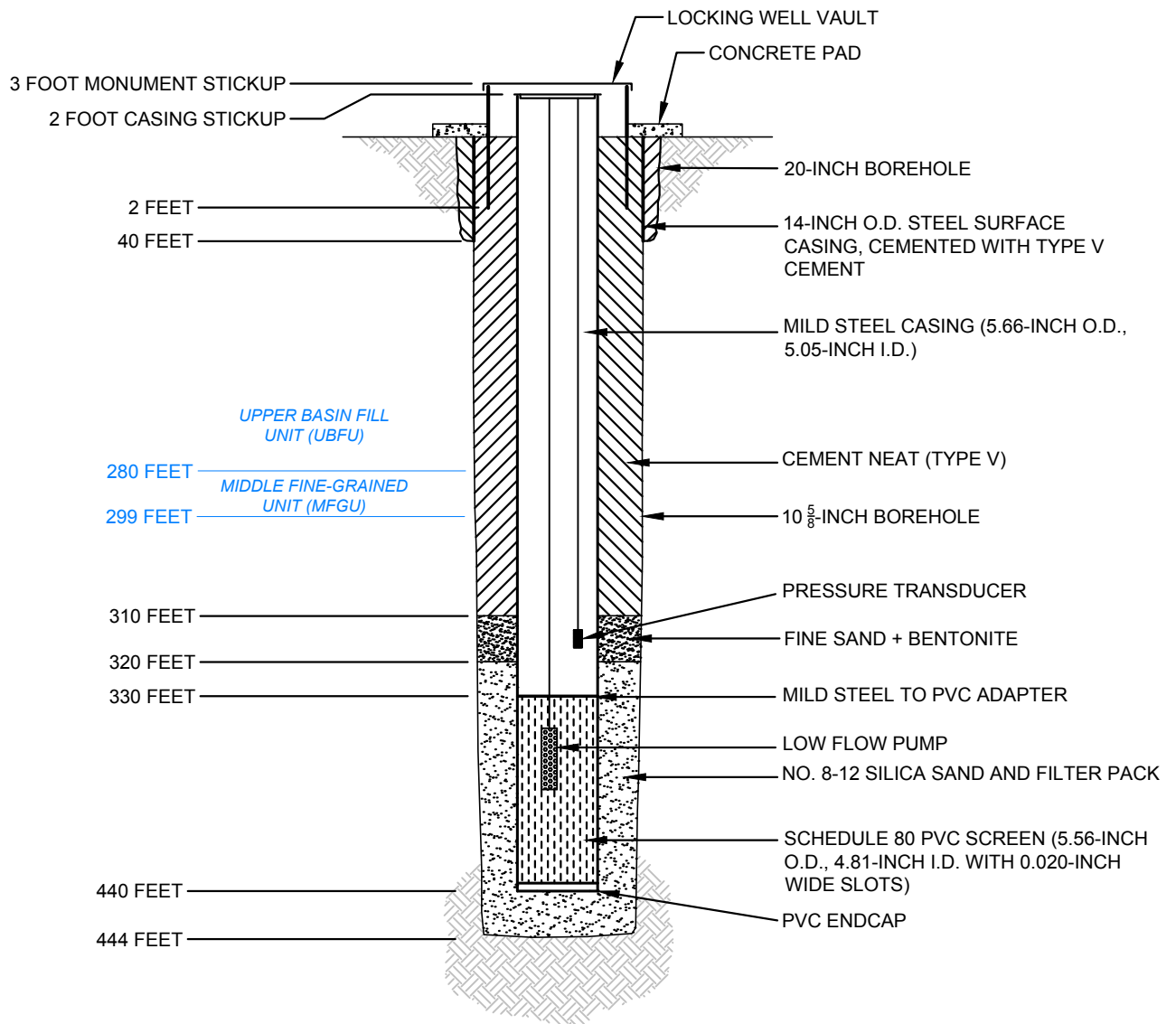
FLORENCE COPPER PROJECT  
FLORENCE, ARIZONA

**WELL LOCATIONS**

**FLORENCE  
COPPER INC.** AUGUST 2018

**FIGURE 1**





#### NOTES

1. WELL REGISTRATION NO.: 55-226799
2. CADASTRAL LOCATION: D (4-9) 28 CAC
3. MEASURING POINT ELEVATION: 1479.00 FEET AMSL
4. I.D. = INSIDE DIAMETER
5. O.D. = OUTSIDE DIAMETER
6. PVC = POLYVINYL CHLORIDE



PRODUCTION TEST FACILITY  
FLORENCE COPPER, INC.  
FLORENCE, ARIZONA

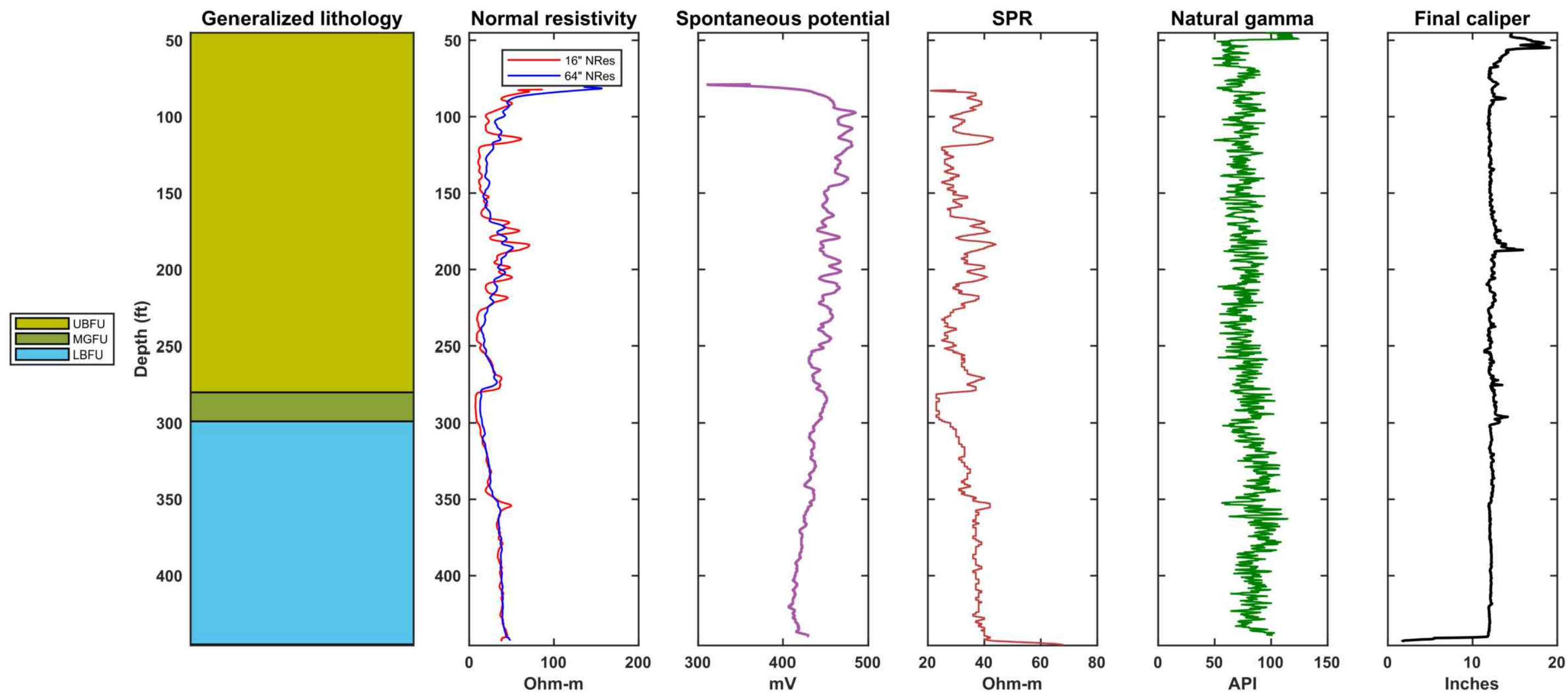
#### MW-01-LBF OPERATIONAL MONITORING WELL AS-BUILT DIAGRAM



SCALE: NOT TO SCALE  
SEPTEMBER 2018

FIGURE 2





HALEY  
ALDRICH

PRODUCTION TEST FACILITY  
FLORENCE COPPER, INC.  
FLORENCE, ARIZONA

MW-01-LBF OPERATIONAL MONITORING  
WELL GEOPHYSICAL DATA AND  
LITHOLOGIC LOG

FLORENCE  
COPPER

SCALE: AS SHOWN  
SEPTEMBER 2018

FIGURE 3

## **APPENDIX A**

### **Arizona Department of Water Resources Well Registry Report**

ARIZONA DEPARTMENT OF WATER RESOURCES  
1110 W. Washington St. Suite 310  
Phoenix, Arizona 85007

THIS AUTHORIZATION SHALL BE IN POSSESSION OF THE DRILLER DURING ALL DRILLING OPERATIONS

WELL REGISTRATION NO: 55-226789

AUTHORIZED DRILLER: NATIONAL EWP, INC.

LICENSE NO: 823

NOTICE OF INTENTION TO DRILL ENV - MONITOR WELL(S) HAS BEEN FILED WITH THE DEPARTMENT BY:

WELL OWNER: FLORENCE COPPER, INC. 1575 W. HUNT HWY FLORENCE, AZ 85132

THE WELL(S) IS/ARE TO BE LOCATED IN THE:

SE 1/4 of the NW 1/4 of the SW 1/4 Section 28 Township 4.0 SOUTH Range 9.0 EAST

NO. OF WELLS IN THIS PROJECT: 1

THIS AUTHORIZATION EXPIRES AT MIDNIGHT ON THE DAY OF January 11, 2018

*Lucia Munillo*

GROUNDWATER PERMITTING AND WELLS

THE DRILLER MUST FILE A LOG OF THE WELL WITHIN 30 DAYS OF COMPLETION OF DRILLING.

RECEIVED

APR 23 2018

ADWR



Did not Drill

NP





Arizona Department of Water Resources  
Information Management Unit  
PO Box 36020 • Phoenix, Arizona 85067-6020  
(602) 771-8527 • 602-771-8500

RECEIVED

APR 23 2010

ADWR

Well Driller Report  
and  
Well Log

THIS REPORT MUST BE FILED WITHIN **30 DAYS** OF COMPLETING THE WELL.

PLEASE PRINT CLEARLY USING BLACK OR BLUE INK

FILE NUMBER

**D(4-9) 28 CBD**

WELL REGISTRATION NUMBER

**55 - 226789**

PERMIT NUMBER (IF ISSUED)

**SECTION 1. DRILLING AUTHORIZATION**

**Drilling Firm**

Mail To:

NAME

NATIONAL EWP, INC.

ADDRESS

1200 W. SAN PEDRO ST.

CITY / STATE / ZIP

GILBERT, AZ, 85233

DWR LICENSE NUMBER

823

TELEPHONE NUMBER

480-558-3500

FAX

**SECTION 1. REGISTRY INFORMATION**

**Well Owner**

FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL

FLORENCE COPPER, INC.

MAILING ADDRESS

1575 W. HUNT HWY

CITY / STATE / ZIP

FLORENCE, AZ, 85132

CONTACT PERSON NAME AND TITLE

**Location of Well**

WELL LOCATION ADDRESS (IF ANY)

TOWNSHIP (N/S)

RANGE (E/W)

SECTION

160 ACRE

40 ACRE

10 ACRE

1/4

1/4

1/4

LATITUDE

LONGITUDE

"N

"W

METHOD OF LATITUDE/LONGITUDE (CHECK ONE)

☐ \*GPS: Hand-Held

☐ USGS Quad Map

☐ Conventional Survey

☐ \*GPS: Survey-Grade

TELEPHONE NUMBER

520 374-3984

FAX

LAND SURFACE ELEVATION AT WELL

Feet Above Sea Level

WELL NAME (e.g., MW-1, PZ-3, lot 25 Well, Smith Well, etc.)

METHOD OF ELEVATION (CHECK ONE)

☐ \*GPS: Hand-Held

☐ USGS Quad Map

☐ Conventional Survey

☐ \*GPS: Survey-Grade

\*IF GPS WAS USED, GEOGRAPHIC COORDINATE DATUM (CHECK ONE)

☐ NAD-83

☒ Other (please specify)

COUNTY

ASSESSOR'S PARCEL ID NUMBER (MOST RECENT)

BOOK

MAP

PARCEL

**SECTION 3. WELL CONSTRUCTION DETAILS**

**Drilling Method**

CHECK ONE

☐ Air Rotary

☐ Bored or Augered

☐ Cable Tool

☐ Dual Rotary

☐ Mud Rotary

☐ Reverse Circulation

☐ Driven

☐ Jetted

☐ Air Percussion / Odex Tubing

☐ Other (please specify)

**Method of Well Development**

CHECK ONE

☐ Airlift

☐ Bail

☐ Surge Block

☐ Surge Pump

☐ Other (please specify)

**Condition of Well**

CHECK ONE

☐ Capped

☐ Pump Installed

**Method of Sealing at Reduction Points**

CHECK ONE

☐ None

☐ Packed

☐ Swedged

☐ Welded

☐ Other (please specify)

**Construction Dates**

DATE WELL CONSTRUCTION STARTED

DATE WELL CONSTRUCTION COMPLETED

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

SIGNATURE OF QUALIFYING PARTY

DATE



Did not Drill

WELL REGISTRATION NUMBER  
55 - 226789

**SECTION 4. WELL CONSTRUCTION DESIGN (AS BUILD) (attach additional page if needed)**

Depth

DEPTH OF BORING

Feet Below Land Surface

DEPTH OF COMPLETED WELL

Feet Below Land Surface

### Water Level Information

STATION	DATE	TIME	WATER LEVEL
1	10/10/2010	08:00	1.2
2	10/10/2010	09:00	1.5
3	10/10/2010	10:00	1.8
4	10/10/2010	11:00	2.1
5	10/10/2010	12:00	2.4
6	10/10/2010	13:00	2.7
7	10/10/2010	14:00	3.0
8	10/10/2010	15:00	3.3
9	10/10/2010	16:00	3.6
10	10/10/2010	17:00	3.9
11	10/10/2010	18:00	4.2
12	10/10/2010	19:00	4.5
13	10/10/2010	20:00	4.8
14	10/10/2010	21:00	5.1
15	10/10/2010	22:00	5.4
16	10/10/2010	23:00	5.7
17	10/10/2010	00:00	6.0
18	10/10/2010	01:00	6.3
19	10/10/2010	02:00	6.6
20	10/10/2010	03:00	6.9
21	10/10/2010	04:00	7.2
22	10/10/2010	05:00	7.5
23	10/10/2010	06:00	7.8
24	10/10/2010	07:00	8.1
25	10/10/2010	08:00	8.4
26	10/10/2010	09:00	8.7
27	10/10/2010	10:00	9.0
28	10/10/2010	11:00	9.3
29	10/10/2010	12:00	9.6
30	10/10/2010	13:00	9.9
31	10/10/2010	14:00	10.2
32	10/10/2010	15:00	10.5
33	10/10/2010	16:00	10.8
34	10/10/2010	17:00	11.1
35	10/10/2010	18:00	11.4
36	10/10/2010	19:00	11.7
37	10/10/2010	20:00	12.0
38	10/10/2010	21:00	12.3
39	10/10/2010	22:00	12.6
40	10/10/2010	23:00	12.9
41	10/10/2010	00:00	13.2
42	10/10/2010	01:00	13.5
43	10/10/2010	02:00	13.8
44	10/10/2010	03:00	14.1
45	10/10/2010	04:00	14.4
46	10/10/2010	05:00	14.7
47	10/10/2010	06:00	15.0
48	10/10/2010	07:00	15.3
49	10/10/2010	08:00	15.6
50	10/10/2010	09:00	15.9
51	10/10/2010	10:00	16.2
52	10/10/2010	11:00	16.5
53	10/10/2010	12:00	16.8
54	10/10/2010	13:00	17.1
55	10/10/2010	14:00	17.4
56	10/10/2010	15:00	17.7
57	10/10/2010	16:00	18.0
58	10/10/2010	17:00	18.3
59	10/10/2010	18:00	18.6
60	10/10/2010	19:00	18.9
61	10/10/2010	20:00	19.2
62	10/10/2010	21:00	19.5
63	10/10/2010	22:00	19.8
64	10/10/2010	23:00	20.1
65	10/10/2010	00:00	20.4
66	10/10/2010	01:00	20.7
67	10/10/2010	02:00	21.0
68	10/10/2010	03:00	21.3
69	10/10/2010	04:00	21.6
70	10/10/2010	05:00	21.9
71	10/10/2010	06:00	22.2
72	10/10/2010	07:00	22.5
73	10/10/2010	08:00	22.8
74	10/10/2010	09:00	23.1
75	10/10/2010	10:00	23.4
76	10/10/2010	11:00	23.7
77	10/10/2010	12:00	24.0
78	10/10/2010	13:00	24.3
79	10/10/2010		

Feet Below Land Surface

DATE MEASURED

TIME MEASURED

IF FLOWING WELL, METHOD OF FLOW REGULATION

☐ Valve☐ Other:[illegible]

Installed Annular Material

DEPTH FROM  
SURFACE

ANNULAR MATERIAL TYPE (T)

## FILTER PACK

FROM  
(feet)

TO  
(feet)

NONE

## CONCRETE

NEAT CEMENT OR  
CEMENT GROUT

CEMENT-BENTONITE

GROUT

GROUT	B8
-------	----

CHIPS

PELLETS

IF OTHER TYPE OF ANNULAR MATERIAL,  
DESCRIBE

SAND

GRAVEL

SIZE

[illegible]

Did not Drill

55 - 226789

[illegible]



Did not Drill

## SECTION 6. WELL SITE PLAN

NAME OF WELL OWNER

FLORENCE COPPER, INC.

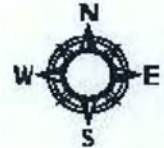
COUNTY ASSESSOR'S PARCEL ID NUMBER (MOST RECENT)

BOOK

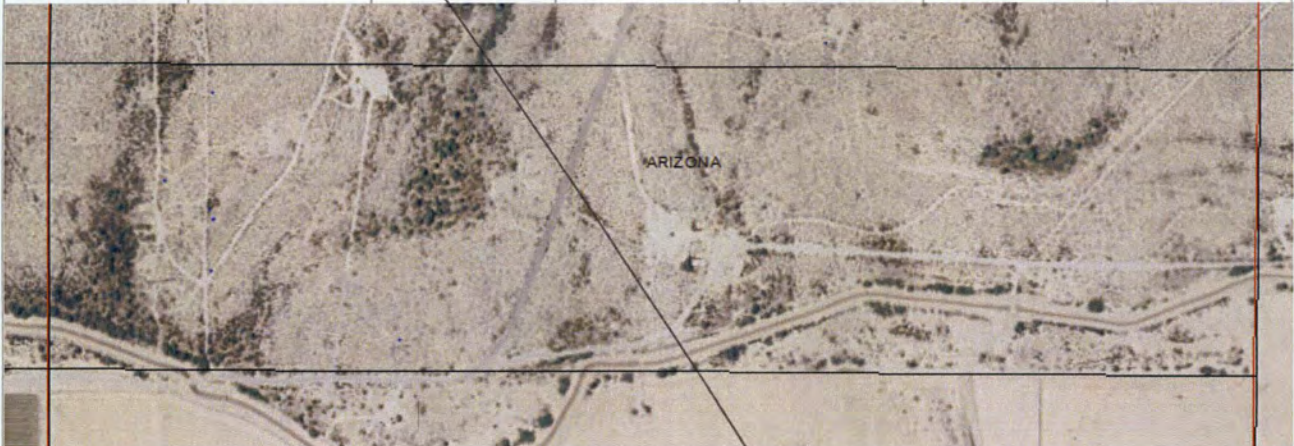
MAP

PARCEL

- ❖ Please draw the following: (1) the boundaries of property on which the well was located; (2) the well location; (3) the locations of all septic tank systems and sewer systems on the property or within 100 feet of the well location, even if on neighboring properties; and (4) any permanent structures on the property that may aid in locating the well.
- ❖ Please indicate the distance between the well location and any septic tank system or sewer system.



1" = \_\_\_\_\_ ft







Arizona Department of Water Resources  
Groundwater Permitting and Wells  
PO Box 36020 • Phoenix, Arizona 85067-6020  
(602) 771-8527 • 602-771-8500  
[www.azwater.gov](http://www.azwater.gov)

## Well Driller Report and Well Log

NA

THIS REPORT MUST BE FILED WITHIN 30 DAYS OF COMPLETING THE WELL.  
PLEASE PRINT CLEARLY USING BLACK OR BLUE INK

FILE NUMBER  
**D(4-9) 28 CBD**  
WELL REGISTRATION NUMBER  
**55 - 226789**  
PERMIT NUMBER (IF ISSUED)

### SECTION 1. DRILLING AUTHORIZATION

#### Drilling Firm

Mail To:	NAME	DWR LICENSE NUMBER
	STEWART BROS DRILLING CO DBA SBQ2 LLC	314
	ADDRESS	TELEPHONE NUMBER
	P.O. BOX 2067	505-287-2986
	CITY / STATE / ZIP	FAX
	MILAN, NM, 87021	

### SECTION 1. REGISTRY INFORMATION

#### Well Owner

FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL  
FLORENCE COPPER, INC.

MAILING ADDRESS  
1575 W. HUNT HIGHWAY

CITY / STATE / ZIP  
FLORENCE, AZ, 85132

CONTACT PERSON NAME AND TITLE

TELEPHONE NUMBER  
520 374-3984

FAX

WELL NAME (e.g., MW-1, PZ-3, lot 25 Well, Smith Well, etc.)  
MW-01-LBF

#### Location of Well

WELL LOCATION ADDRESS (IF ANY)

TOWNSHIP (N/S)	RANGE (E/W)	SECTION	160 ACRE	40 ACRE	10 ACRE
4S	9E	28	56 1/4	14 1/4	3 1/4
LATITUDE			LONGITUDE		
33°	3	2.95	111°	26	7.11
DEGREES	MINUTES	SECONDS	DEGREES	MINUTES	SECONDS

METHOD OF LATITUDE/LONGITUDE (CHECK ONE)

☒ \*GPS: Hand-Held ☐ Conventional Survey ☐ \*GPS: Survey-Grade

LAND SURFACE ELEVATION AT WELL

N/A

Feet Above Sea Level

METHOD OF ELEVATION (CHECK ONE)

☐ \*GPS: Hand-Held ☐ Conventional Survey ☐ \*GPS: Survey-Grade

\*IF GPS WAS USED, GEOGRAPHIC COORDINATE DATUM (CHECK ONE)

☐ NAD-83 ☐ Other (please specify)

COUNTY

Pinal

ASSESSOR'S PARCEL ID NUMBER (MOST RECENT)

BOOK

MAP

PARCEL

1001

RECEIVED

MAR 30 2018

ADWR

### SECTION 3. WELL CONSTRUCTION DETAILS

#### Drilling Method

CHECK ONE

- ☐ Air Rotary  
☐ Bored or Augered  
☐ Cable Tool  
☐ Dual Rotary  
☒ Mud Rotary  
☐ Reverse Circulation  
☐ Driven  
☐ Jetted  
☐ Air Percussion / Odex Tubing  
☐ Other (please specify)

#### Method of Well Development

CHECK ONE

- ☒ Airlift  
☐ Bail  
☐ Surge Block  
☐ Surge Pump  
☐ Other (please specify)

#### Condition of Well

CHECK ONE

- ☒ Capped  
☐ Pump Installed

#### Method of Sealing at Reduction Points

CHECK ONE

- ☐ None  
☐ Packed  
☐ Swedged  
☐ Welded  
☐ Other (please specify)

Cement

#### Construction Dates

DATE WELL CONSTRUCTION STARTED

12/16/17

DATE WELL CONSTRUCTION COMPLETED

2/4/18

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and belief.

SIGNATURE OF QUALIFYING PARTY

*Randy Stewart*

DATE

2/28/18



## Well Driller Report and Well Log

WELL REGISTRATION NUMBER

55 - 226789

**SECTION 4. WELL CONSTRUCTION DESIGN (AS BUILT)** (attach additional page if needed)**Depth**

DEPTH OF BORING

640

Feet Below Land Surface

DEPTH OF COMPLETED WELL

630

Feet Below Land Surface

**Water Level Information**

STATIC WATER LEVEL

220

Feet Below Land Surface

DATE MEASURED

2/4/18

TIME MEASURED

IF FLOWING WELL, METHOD OF FLOW REGULATION

☐ Valve ☐ Other:

Borehole			Installed Casing													
DEPTH FROM SURFACE		BOREHOLE DIAMETER (inches)	DEPTH FROM SURFACE		OUTER DIAMETER (inches)	MATERIAL TYPE ( T )				PERFORATION TYPE ( T )					SLOT SIZE IF ANY (inches)	
FROM (feet)	TO (feet)		FROM (feet)	TO (feet)		STEEL	PVC	ABS	IF OTHER TYPE, DESCRIBE	BLANK OR NONE	WIRE WRAP	SHUTTER SCREEN	MILLS KNIFE	SLOTTED		IF OTHER TYPE, DESCRIBE
0	40	20	0	40	14	X				X						
40	640	12 1/4	0	330	5 9/16	X										
			330	630	5 9/16		X								Screen	.020

Installed Annular Material										
DEPTH FROM SURFACE		ANNULAR MATERIAL TYPE ( T )							FILTER PACK	
FROM (feet)	TO (feet)	NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	BENTONITE				SIZE
						GROUT	CHIPS	PELLETS	IF OTHER TYPE OF ANNULAR MATERIAL, DESCRIBE	
0	310			X						
310	320								Fine Sand	
320	640								Silica Sand	8-12

## Well Driller Report and Well Log

WELL REGISTRATION NUMBER

55 - 226789

## SECTION 5. GEOLOGIC LOG OF WELL

[illegible]



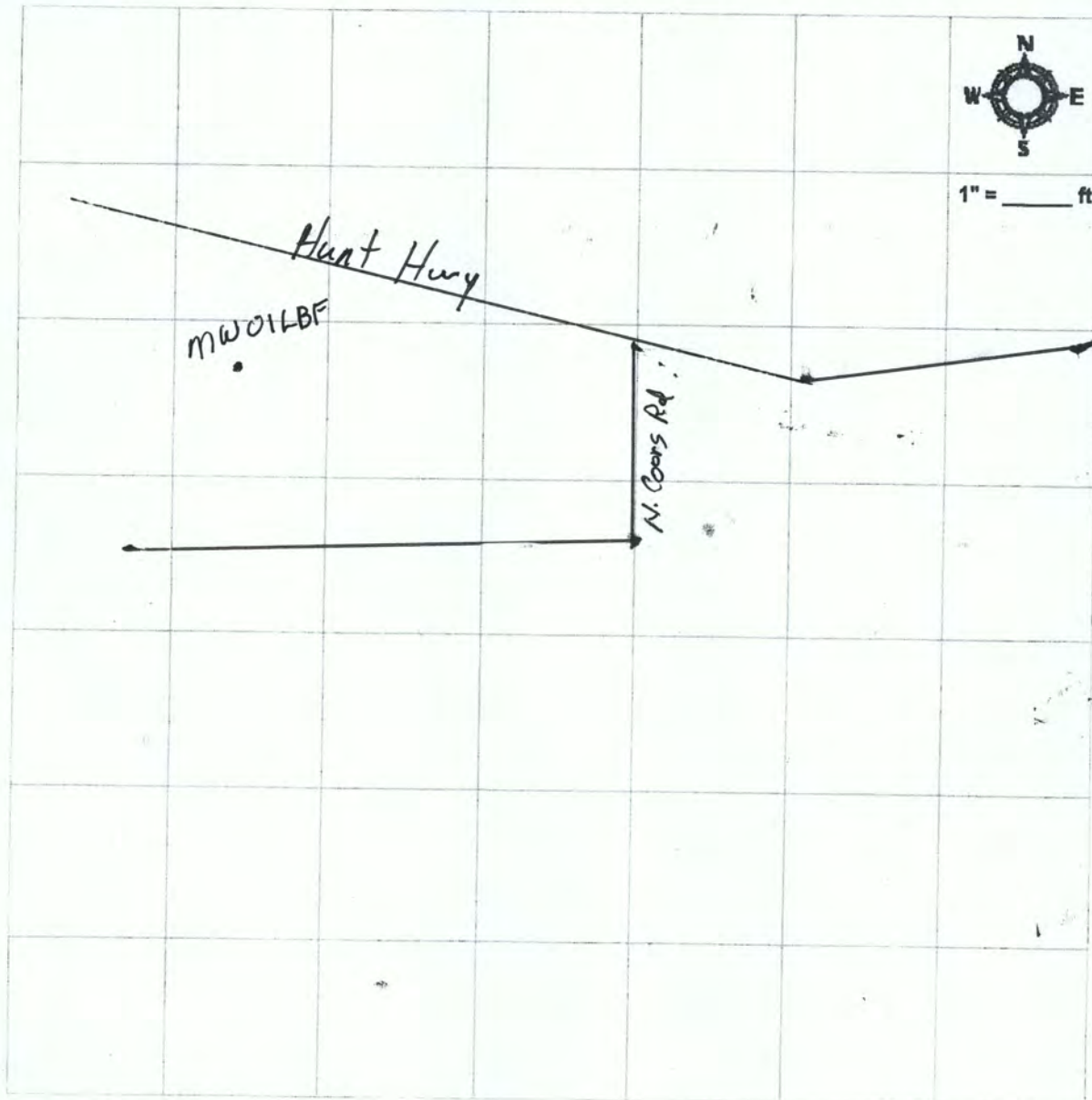
# Well Driller Report and Well Log

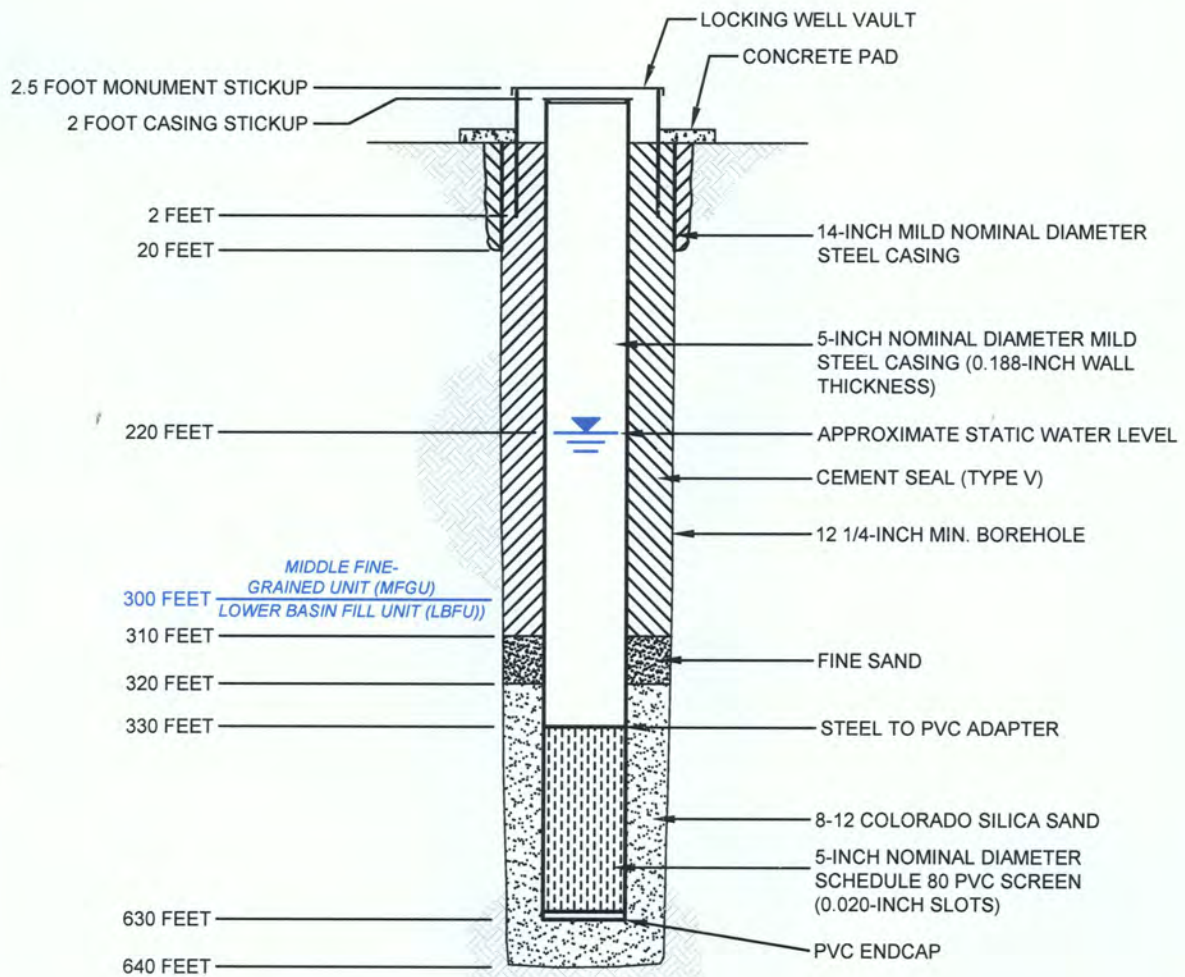
WELL REGISTRATION NUMBER  
55 - 226789

## SECTION 6. WELL SITE PLAN

NAME OF WELL OWNER	COUNTY ASSESSOR'S PARCEL ID NUMBER (MOST RECENT)		
FLORENCE COPPER, INC.	BOOK	MAP	PARCEL

- Required for all wells, please draw the following: (1) the boundaries of property on which the well was located; (2) the well location; (3) the locations of all septic tank systems and sewer systems on the property or within 100 feet of the well location, even if on neighboring properties; and (4) any permanent structures on the property that may aid in locating the well.
- Please indicate the distance between the well location and any septic tank system or sewer system.





**HALEY  
 ALDRICH**

FLORENCE COPPER, INC.  
 FLORENCE, ARIZONA

# OPERATIONAL MONITORING WELL MW-01-LBF DESIGN

**FLORENCE  
 COPPER INC.**

SCALE: NOT TO SCALE  
 JUNE 2015

**FIGURE 1**



Run Date: 01/13/2017

## AZ DEPARTMENT OF WATER RESOURCES

### WELL REGISTRY REPORT - WELLS55

---

Location	D	4.0	9.0	28	C	B	D	Well Reg.No	55 - 226789	AMA	PINAL	AMA
----------	---	-----	-----	----	---	---	---	-------------	-------------	-----	-------	-----

Registered Name	FLORENCE COPPER, INC. 1575 W. HUNT HWY  FLORENCE	AZ 85132	File Type	NEW WELLS (INTENTS OR APPLICATIONS)
			Application/Issue Date	01/11/2017

Owner	OWNER	Well Type	ENV - MONITOR
Driller No.	823	SubBasin	ELOY
Driller Name	NATIONAL EWP, INC.	Watershed	UPPER GILA RIVER
Driller Phone	480-558-3500	Registered Water Uses	MONITORING
County	PINAL	Registered Well Uses	MONITOR
		Discharge Method	NO DISCHARGE METHOD LISTED
Intended Capacity GPM	0.00	Power	NO POWER CODE LISTED

Well Depth	0.00	Case Diam	0.00	Tested Cap	0.00
Pump Cap.	0.00	Case Depth	0.00	CRT	
Draw Down	0.00	Water Level	0.00	Log	
		Acres Irrig	0.00	Finish	NO CASING CODE LISTED

Contamination Site: NO - NOT IN ANY REMEDIAL ACTION SITE

Tribe: Not in a tribal zone

Comments Well MW-01-LBF  
Landownership: AZ State Land Dept. (Mineral Lease #11-026500)  
TV

Current Action

1/13/2017	555	DRILLER & OWNER PACKETS MAILED
Action Comment: TNV		

Action History

1/13/2017	550	DRILLING AUTHORITY ISSUED
Action Comment: TNV		
1/11/2017	155	NOI RECEIVED FOR A NEW NON-PRODUCTION WELL
Action Comment: TNV		

ARIZONA DEPARTMENT OF WATER RESOURCES  
1110 W. Washington St. Suite 310  
Phoenix, Arizona 85007

THIS AUTHORIZATION SHALL BE IN POSSESSION OF THE DRILLER DURING ALL DRILLING OPERATIONS

WELL REGISTRATION NO: 55-226789

AUTHORIZED DRILLER: NATIONAL EWP, INC.

LICENSE NO: 823

NOTICE OF INTENTION TO DRILL ENV - MONITOR WELL(S) HAS BEEN FILED WITH THE DEPARTMENT BY:

WELL OWNER: FLORENCE COPPER, INC. 1575 W. HUNT HWY FLORENCE, AZ, 85132

THE WELL(S) IS/ARE TO BE LOCATED IN THE:

SE 1/4 of the NW 1/4 of the SW 1/4 Section 28 Township 4.0 SOUTH Range 9.0 EAST

NO. OF WELLS IN THIS PROJECT: 1

THIS AUTHORIZATION EXPIRES AT MIDNIGHT ON THE DAY OF January 11, 2018

*Sella Munillo*

GROUNDWATER PERMITTING AND WELLS

THE DRILLER MUST FILE A LOG OF THE WELL WITHIN 30 DAYS OF COMPLETION OF DRILLING.



ARIZONA DEPARTMENT of WATER RESOURCES  
1110 W. Washington St. Suite 310  
Phoenix, AZ 85007  
602-771-8500  
azwater.gov

January 13, 2017

FLORENCE COPPER, INC.  
1575 W. HUNT HWY  
FLORENCE, AZ 85132



DOUGLAS A. DUCEY  
Governor

THOMAS BUSCHATZKE  
Director

Registration No. 55- 226789  
File Number: D(4-9) 28 CBD

Dear Well Applicant:

Enclosed is a copy of the Notice of Intention to Drill (NOI) a well which you or your driller recently filed with the Department of Water Resources. This letter is to inform you that the Department has approved the NOI and has mailed, or made available for download, a drilling authorization card to your designated well drilling contractor. The driller may not begin drilling until he/she has received the authorization, and must keep it in their possession at the well site during drilling. Although the issuance of this drill card authorizes you to drill the proposed well under state law, the drilling of the well may be subject to restrictions or regulations imposed by other entities.

Well drilling activities must be completed within one year after the date the NOI was filed with the Department. If drilling is not completed within one year, a new NOI must be filed and authorization from this Department received before proceeding with drilling. If the well cannot be successfully completed as initially intended (dry hole, cave in, lost tools, etc.), the well must be properly abandoned and a Well Abandonment Completion Report must be filed by your driller [as required by A.A.C. R12-15-816(F)].

If you change drillers, you must notify the Department of the new driller's identity on a Request to Change Well Information (form 55-71A). Please ensure that the new driller is licensed by the Department to drill the type of well you require. A new driller may not begin drilling until he/she receives a new drilling authorization card from the Department.

If you find it necessary to change the location of the proposed well(s), you may not proceed with drilling until you file an amended NOI with the Department. An amended drilling authorization card will then be issued to the well drilling contractor, which must be in their possession before drilling begins.

Arizona statute [A.R.S. § 45-600] requires registered well owners to file a Pump Installation Completion Report (form 55-56) with the Department within 30 days after the installation of pumping equipment, if authorized. A blank report is enclosed for your convenience. State statute also requires the driller to file a complete and accurate Well Drillers Report and Well Log (form 55-55) within 30 days after completion of drilling. A blank report form was provided to your driller with the drilling authorization card. You should insist and ensure that all of the required reports are accurately completed and timely filed with the Department.

Please be advised that Arizona statute [A.R.S. § 45-593(C)] requires a registered well owner to notify the Department of a change in ownership of the well and/or information pertaining to the physical characteristics of the well in order to keep this well registration file current and accurate. Any change in well information or a request to change well driller must be filed on a Request to Change Well Information form (form 55-71A) that may be downloaded from the ADWR Internet website at [www.azwater.gov](http://www.azwater.gov).

Sincerely,

Groundwater Permitting and Wells Section



<b>Arizona Department of Water Resources</b> Groundwater Permitting and Wells Section P.O. Box 36020 Phoenix, Arizona 85067-6020 (602) 771-8500 • (602) 771-8690 www.azwater.gov	<b>Notice of Intent to Drill, Deepen, or Modify a Monitor / Piezometer / Environmental Well</b>	<b>\$150 FEE</b>
--	---	----------------------

- ❖ Review instructions prior to completing form in black or blue ink.
  - ❖ You must include with your Notice:
    - \$150 check or money order for the filing fee.
    - Well construction diagram, labeling all specifications listed in Section 6 and Section 7.
- Authority for fee: A.R.S. § 45-596 and A.A.C. R12-15-104.

AMA / INA <b>Pinal</b>	RECEIVED DATE <b>1/11/2017</b>	ISSUED DATE <b>1/13/2017</b>	SB <b>11</b>	WS <b>08 UGR</b>	REMEDIAL ACTION SITE <b>000</b>	FILE NUMBER <b>D(4-9)28 CBD</b>	WELL REGISTRATION NUMBER <b>55 - 226789</b>
---------------------------	-----------------------------------	---------------------------------	-----------------	---------------------	------------------------------------	------------------------------------	--

### SECTION 1. REGISTRY INFORMATION

To determine the location of well, please refer to the Well Registry Map (<https://gisweb.azwater.gov/WellRegistry/Default.aspx>) and/or Google Earth (<http://www.earthpoint.us/Townships.aspx>)

Well Type	Proposed Action	Location of Well																		
CHECK ONE <input checked="" type="checkbox"/> Monitor <input type="checkbox"/> Piezometer <input type="checkbox"/> Vadose Zone <input type="checkbox"/> Air Sparging <input type="checkbox"/> Soil Vapor Extraction <input type="checkbox"/> Other (please specify):	CHECK ONE <input checked="" type="checkbox"/> Drill New Well <input type="checkbox"/> Deepen <input type="checkbox"/> Modify  WELL REGISTRATION NUMBER (if Deepening or Modifying) <b>55 -</b>	WELL LOCATION ADDRESS (IF ANY)  <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>TOWNSHIP(N/S)</th> <th>RANGE (E/W)</th> <th>SECTION</th> <th>160 ACRE</th> <th>40 ACRE</th> <th>10 ACRE</th> </tr> <tr> <td>4.0 S</td> <td>9.0 E</td> <td>28</td> <td>SW ¼</td> <td>NW ¼</td> <td>SE ¼</td> </tr> </table> COUNTY ASSESSOR'S PARCEL ID NUMBER <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>BOOK</th> <th>MAP</th> <th>PARCEL</th> </tr> <tr> <td></td> <td></td> <td>1001</td> </tr> </table> COUNTY WHERE WELL IS LOCATED <b>PINAL</b>	TOWNSHIP(N/S)	RANGE (E/W)	SECTION	160 ACRE	40 ACRE	10 ACRE	4.0 S	9.0 E	28	SW ¼	NW ¼	SE ¼	BOOK	MAP	PARCEL			1001
TOWNSHIP(N/S)	RANGE (E/W)	SECTION	160 ACRE	40 ACRE	10 ACRE															
4.0 S	9.0 E	28	SW ¼	NW ¼	SE ¼															
BOOK	MAP	PARCEL																		
		1001																		

### SECTION 2. OWNER INFORMATION

Land Owner	Well Owner (check this box if Land Owner and Well Owner are same <input type="checkbox"/> )
FULL NAME OF COMPANY, ORGANIZATION, OR INDIVIDUAL <b>AZ State Land Dept (Mineral Lease # 11-026500)</b>	FULL NAME OF COMPANY, GOVERNMENT AGENCY, OR INDIVIDUAL <b>Florence Copper, Inc.</b>
MAILING ADDRESS <b>1616 W Adams St</b>	MAILING ADDRESS <b>1575 W Hunt Hwy</b>
CITY / STATE / ZIP CODE <b>Phoenix, AZ 85007</b>	CITY / STATE / ZIP CODE <b>Florence, AZ 85132</b>
CONTACT PERSON NAME AND TITLE <b>Lisa Atkins, State Land Commissioner</b>	CONTACT PERSON NAME AND TITLE <b>Ian Ream, Senior Hydrogeologist</b>
TELEPHONE NUMBER <b>(602) 542-4631</b>	TELEPHONE NUMBER <b>(520) 374-3984</b>
FAX	FAX <b>(520) 374-3999</b>

### SECTION 3. DRILLING AUTHORIZATION

Drilling Firm	Consultant (if applicable)
NAME <b>National EWP</b>	CONSULTING FIRM <b>Haley &amp; Aldrich, Inc.</b>
DWR LICENSE NUMBER <b>823</b>	CONTACT PERSON NAME <b>Mark Nicholls</b>
ROC LICENSE CATEGORY <b>A-4</b>	TELEPHONE NUMBER <b>602-760-2423</b>
TELEPHONE NUMBER <b>(480) 558-3500</b>	FAX <b>602-760-2448</b>
FAX <b>480-558-3525</b>	EMAIL ADDRESS <b>mnicholls@haleyaldrich.com</b>
EMAIL ADDRESS <b>jstephens@nationalewp.com</b>	

### SECTION 4.

Questions	Yes	No	Explanation:
1. Are all annular spaces between the casing(s) and the borehole for the placement of grout at least 2 inches?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2-inch annular spaces are special standards required for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
2. Is the screened or perforated interval of casing greater than 100 feet in length?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	100-foot maximum screen intervals are a special standard for wells located in and near groundwater contamination sites (such as CERCLA, WQARF, DOD, LUST).
3. Are you requesting a variance to use thermoplastic casing in lieu of steel casing in the surface seal?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	The wells must be constructed in a vault. Pursuant to A.A.C. R12-15-801 (27) a "vault" is defined as a tamper-resistant watertight structure used to complete a well below the land surface.
4. Is there another well name or identification number associated with this well? (e.g., MW-1, PZ2, 06-04, etc.)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If yes, please state <b>MW-01-LBF</b>
5. Have construction plans been coordinated with the Arizona Department of Environmental Quality?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If yes, please state agency contact & phone number <b>David Haas, 602-771-4669</b>
6. For monitor wells, is dedicated pump equipment to be installed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If yes, please state design pump capacity (Gallons per Minute) <b>Low-flow</b>
7. Is this well a new well located in an Active Management Area AND intended to pump water for the purpose of remediating groundwater?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	You must also file a supplemental form A.R.S. § 45-454(c) & (f) unless the well is a replacement well and the total number of operable wells on the site is not increasing. (See instructions)
8. Will the well registration number be stamped on the vault cover or on the upper part of the casing?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If no, where will the registration number be placed?



Notice of Intent to Drill, Deepen, or Modify a Monitor / Piezometer / Environmental Well

WELL REGISTRATION NUMBER  
55 - ~~226~~789

**SECTION 6. WELL CONSTRUCTION DETAILS**

Drill Method	Method of Well Development	Grout Emplacement Method
CHECK ONE <input type="checkbox"/> Air Rotary <input type="checkbox"/> Bored or Augered <input type="checkbox"/> Cable Tool <input type="checkbox"/> Dual Rotary <input checked="" type="checkbox"/> Mud Rotary <input type="checkbox"/> Reverse Circulation <input type="checkbox"/> Driven <input type="checkbox"/> Jetted <input type="checkbox"/> Air Percussion / Odex Tubing <input type="checkbox"/> Other (please specify):	CHECK ONE <input checked="" type="checkbox"/> Airlift <input type="checkbox"/> Bail <input type="checkbox"/> Surge Block <input type="checkbox"/> Surge Pump <input type="checkbox"/> Other (please specify):	CHECK ONE <input checked="" type="checkbox"/> Tremie Pumped (Recommended) <input type="checkbox"/> Gravity <input type="checkbox"/> Pressure Grout <input type="checkbox"/> Other (please specify):
DATE CONSTRUCTION TO BEGIN 01/16/2017	Method of Sealing at Reduction Points CHECK ONE <input checked="" type="checkbox"/> None <input type="checkbox"/> Welded <input type="checkbox"/> Swedged <input type="checkbox"/> Packed <input type="checkbox"/> Other (please specify):	Surface or Conductor Casing CHECK ONE <input type="checkbox"/> Flush Mount in a vault <input checked="" type="checkbox"/> Extends at least 1' above grade

**SECTION 7. PROPOSED WELL CONSTRUCTION PLAN** (attach additional page if needed)

Attach a well construction diagram labeling all specifications below.

Borehole			Casing													
DEPTH FROM SURFACE		BOREHOLE DIAMETER (inches)	DEPTH FROM SURFACE		OUTER DIAMETER (inches)	MATERIAL TYPE ( T )				PERFORATION TYPE ( T )						SLOT SIZE IF ANY (inches)
FROM (feet)	TO (feet)		FROM (feet)	TO (feet)		STEEL	PVC	ABS	IF OTHER TYPE, DESCRIBE	BLANK OR NONE	WIRE WRAP	SHUTTER SCREEN	MILLS	KNIFE	SLOTTED	
0	20	14	0	20	14	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
20	640	10.5	0	330	5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
			330	630	5	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		0.020

Annular Material														
DEPTH FROM SURFACE		ANNULAR MATERIAL TYPE ( T )							FILTER PACK					
FROM (feet)	TO (feet)	NONE	CONCRETE	NEAT CEMENT OR CEMENT GROUT	CEMENT-BENTONITE GROUT	BENTONITE GROUT	CHIPS	PELLETS	IF OTHER TYPE OF ANNULAR MATERIAL, DESCRIBE			SAND	GRAVEL	SIZE
0	310	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	
310	320	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	Fine sand
320	640	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input checked="" type="checkbox"/>	<input type="checkbox"/>	No. 8-12

IF THIS WELL HAS NESTED CASINGS, SPECIFY NUMBER OF CASING STRINGS: \_\_\_\_\_

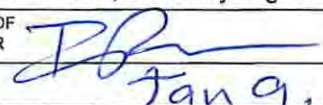
EXPECTED DEPTH TO WATER (Feet Below Ground Surface): 220

**SECTION 8. PERMISSION TO ACCESS**

☐ By checking this box, I hereby provide ADWR permission to enter the property for the purpose of taking water level measurements at this well. (See instructions.)

**SECTION 9. LAND OWNER AND WELL OWNER SIGNATURE**

I state that this notice is filed in compliance with A.R.S. § 45-596 and is complete and correct to the best of my knowledge and

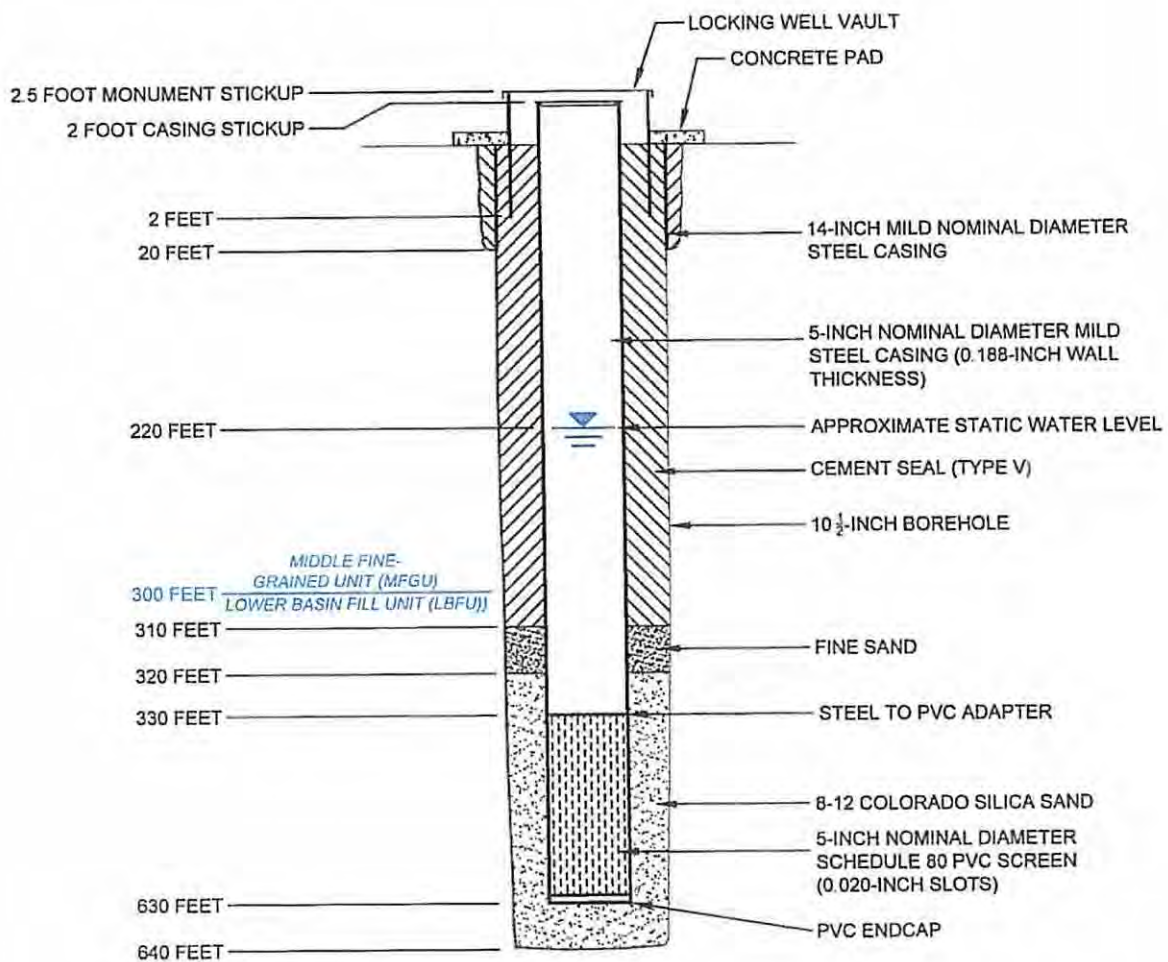
Land Owner	Well Owner (if different from Land Owner; See instructions)
PRINT NAME AND TITLE	PRINT NAME AND TITLE Ian Ream, Senior Hydrogeologist
SIGNATURE OF LAND OWNER	SIGNATURE OF WELL OWNER 
DATE	DATE Jan 9, 2017
<input type="checkbox"/> By checking this box, you agree to allow ADWR to contact you via electronic mail.	<input checked="" type="checkbox"/> By checking this box, you agree to allow ADWR to contact you via electronic mail.
EMAIL ADDRESS	EMAIL ADDRESS IanReam@florencecopper.com

**SECTION 5. Well Construction Diagram**

Provide a well construction diagram showing all existing well construction features listed in Section 6 and Section 7.

See attached well diagram.

55-226789



MOBINI, GITA  
G:\PROJECTS\CURIS RESOURCES\38706-CURIS FEASIBILITY\DRAWINGS\MW-01-LBF WELL DESIGN.DWG  
Printed: 8/26/2015 2:42 PM Layout: MW-01-LBF

HALEY  
ALDRICH

FLORENCE COPPER, INC.  
FLORENCE, ARIZONA

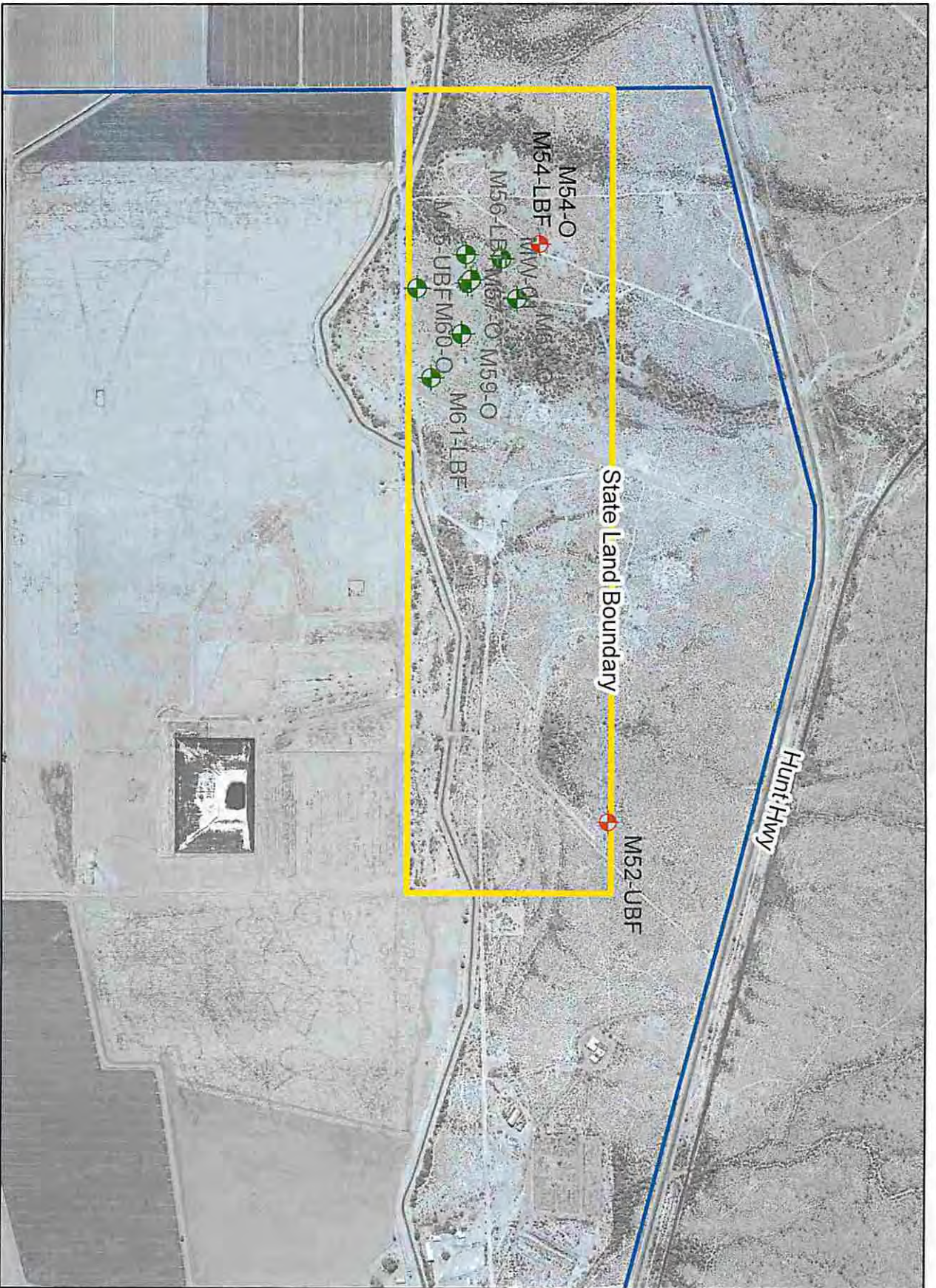
# MW-01-LBF WELL CONSTRUCTION DIAGRAM

FLORENCE  
COPPER INC.

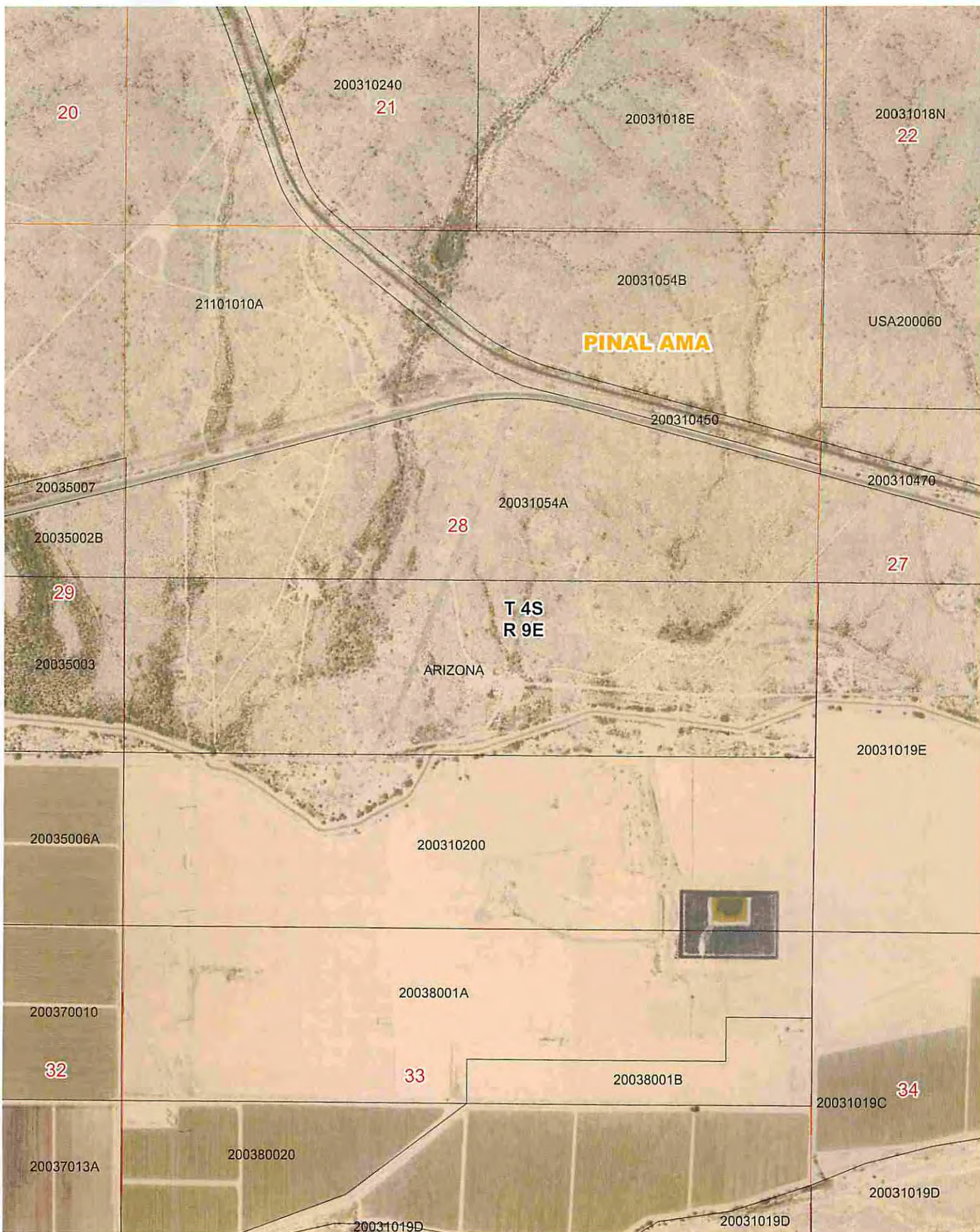
SCALE: NOT TO SCALE

FIGURE 1











## Torren Valdez

---

**From:** Ian Ream <IanReam@florencecopper.com>  
**Sent:** Friday, January 13, 2017 9:06 AM  
**To:** Torren Valdez  
**Subject:** Re: Map of monitor well locations

Hi Torren,

The pumps will be QED micro purge. They typically do a liter or two a minute. Very low flow. Looking for discreet interval samples. The flow rate is based on drawdown. The goal is not to draw down the well much more than a half a foot or 1 foot.

Thanks,

Ian Ream  
Senior Hydrogeologist  
Florence Copper

On Jan 13, 2017, at 8:56 AM, Torren Valdez <[tvaldez@azwater.gov](mailto:tvaldez@azwater.gov)> wrote:

Ian,

Would you happen to know the pump capacity (gpm) for the low-flow pumps that will be installed on those monitoring wells?

Thank you,

**Torren Valdez**  
Water Planning & Permitting Division  
Arizona Department of Water Resources  
602.771.8614

<image002.jpg>

---

**From:** Ian Ream [<mailto:IanReam@florencecopper.com>]  
**Sent:** Thursday, January 12, 2017 11:13 AM  
**To:** Torren Valdez <[tvaldez@azwater.gov](mailto:tvaldez@azwater.gov)>  
**Subject:** Map of monitor well locations

Hi Torren,

Here is a map with the well locations.

Please don't hesitate to contact me if you need anything else or have any questions.

Cheers,

Ian

**Ian Ream** Senior Hydrogeologist

<image003.jpg>

Florence Copper Inc.

1575 W. Hunt Highway Florence AZ USA 85132

C 520-840-9604 T 520-374-3984 F 520-374-3999

E [ianream@florencecopper.com](mailto:ianream@florencecopper.com) Web [florencecopper.com](http://florencecopper.com)

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**\*Notice Regarding Transmission**

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## **NOTICE**

A.R.S. § 41-1030(B), (D), (E) and (F) provide as follows:

B. An agency shall not base a licensing decision in whole or in part on a licensing requirement or condition that is not specifically authorized by statute, rule or state tribal gaming compact. A general grant of authority in statute does not constitute a basis for imposing a licensing requirement or condition unless a rule is made pursuant to that general grant of authority that specifically authorizes the requirement or condition.

D. This section may be enforced in a private civil action and relief may be awarded against the state. The court may award reasonable attorney fees, damages and all fees associated with the license application to a party that prevails in an action against the state for a violation of this section.

E. A state employee may not intentionally or knowingly violate this section. A violation of this section is cause for disciplinary action or dismissal pursuant to the agency's adopted personnel policy.

F. This section does not abrogate the immunity provided by section 12-820.01 or 12-820.02.

ARIZONA DEPARTMENT of WATER RESOURCES  
1110 W. Washington St. Suite 310  
Engineering and Permits Division  
Phoenix, AZ 85007  
602-771-8500

**NOTICE TO WELL DRILLERS**

This is a reminder that a valid drill card be present for the drilling of each and every well constructed on a site.\* The problem seems to occur during the construction of a well when an unexpected problem occurs. Either the hole collapses, the hole is dry, a drill bit is lost and can't be recovered, or any number of other situations where the driller feels that he needs to move over and start another well. If you encounter this type of scenario, please be aware drillers do not have the authority to start another well without first obtaining drilling authority for the new well. Please note the following statutes and regulations pertaining to well drilling and construction:

**ARIZONA REVISED STATUTE (A.R.S.)**

**A.R.S. § 45-592.A.**

A person may construct, replace or deepen a well in this state only pursuant to this article and section 45-834.01. The drilling of a well may not begin until all requirements of this article and section 45-834.01, as applicable, are met.

\*\*\*

**A.R.S. § 594.A.**

The director shall adopt rules establishing construction standards for new wells and replacement wells, the deepening and abandonment of existing wells and the capping of open wells.

\*\*\*

**A.R.S. § 600.A**

A well driller shall maintain a complete and accurate log of each well drilled.



**ARIZONA ADMINISTRATIVE CODE (A.A.C.)**

**A.A.C. R12-15-803.A.**

**A person shall not drill or abandon a well, or cause a well to be drilled or abandoned, in a manner which is not in compliance with A.R.S. Title 45, Chapter 2, Article 10, and the rules adopted thereunder.**

**\*\*\***

**A.A.C. R12-15-810.A.**

**A well drilling contractor or single well licensee may commence drilling a well only if the well drilling contractor or licensee has possession of a drilling card at the well site issued by the Director in the name of the well drilling contractor or licensee, authorizing the drilling of the specific well in the specific location.**

**\*\*\***

**A.A.C. R12-15-816.F.**

**In the course of drilling a new well, the well may be abandoned without first filing a notice of intent to abandon and without an abandonment card.**

**\* THIS REQUIREMENT DOES NOT PERTAIN TO THE DRILLING OF MINERAL EXPLORATION,  
GEOTECHNICAL OR HEAT PUMP BOREHOLES**

## Transaction Receipt - Success

Arizona Water Resources  
Arizona Water Resources  
MID:347501639533  
1700 W Washington St  
Phoenix , AZ 85012  
602-771-8454

---

01/11/2017 04:20PM  
Remittance ID  
Arizona011117181536095Ald  
Transaction ID:  
178069995

---

KELSEY SHERRARD  
500 Maint St  
WOODLAND, California 95695  
United States  
Visa - 3420  
Approval Code: 040691

---

Sale  
Amount: \$1,800.00

---

55-226788, 55-226789, 55-226790, 55-226791, 55-226792, 55-226793, 55-226794, 55-226795, 55-226796, 55-226797, 55-226798, 55-226799

N/A

Cash Reciepts

0

palder@azwater.gov

---

Cardmember acknowledges  
receipt of goods and/or  
services in the amount of  
the total shown hereon and  
agrees to perform the  
obligations set forth by the  
cardmember's agreement with  
the issuer.

Signature

click here to continue.

Phone Order

**Arizona Department of Water Resources**

1110 West Washington Street, Suite 310

Phoenix AZ 85007

Customer:

KELSEY SHERRARD  
500 MAIN STREET  
WOODLAND, CA 95695

Receipt #: 17-49315  
Office: MAIN OFFICE  
Receipt Date: 01/11/2017  
Sale Type: Mail  
Cashier: WRPXA

Item No.	Function Code	AOBJ	Description	Ref ID	Qty	Unit Price	Ext Price
8505	122221	4439-6F	MONITOR, PIEZOMETER, AIR SPARGING, SOIL VAPOR EXTR		12	150.00	1,800.00
RECEIPT TOTAL:							1,800.00

Payment type: CREDIT CARD

Amount Paid: \$1,800.00

Authorization 178069995

Payment Received Date: 01/11/2017

Notes: Credit card payment for \$1,800.00 is for well registration numbers 55-226788, 55-226789, 55-226790, 55-226791, 55-226792, 55-226793, 55-226794, 55-226795, 55-226796, 55-226797, 55-226798, 55-226799

## **APPENDIX B**

### **Lithologic Log**

H&A-LITHOLOG-Phoenix-NO WELL HA-LIB09-PHX GLB LITHOLOGIC REPORT DATATEMPLATE+GDT \\HALEY\ALDRICH\COMMON\129687\GINT\129687-LITH\_KF.GPJ 31 Aug 18

HALEY ALDRICH				LITHOLOGIC LOG		MW01-LBF	
Project      Production Test Facility, Florence, Arizona						File No. 129687	
Client        Florence Copper, Inc.						Sheet No. 1 of 6	
Contractor   Cascade Drilling LLC						Cadastral Location D (4-9) 28 CBD	
Drilling Method		Conventional Mud Rotary		Land Surface Elevation   1477.38                      feet, amsl		Start      21 November 2017	
Borehole Diameter(s)		20/12.25 in.		Datum        State Plane NAD 83		Finish    19 December 2017	
Rig Make & Model		Schramm T685WS		Location    N 746,361                      E 847,488		H&A Rep.   S. Hensel/C. Giusti	
Depth (ft)	Elevation	USCS Symbol	Stratum Change Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION		COMMENTS	
0		SC		<b>CLAYEY SAND (0-5 feet)</b> Primarily fine to medium sand with ~40% fines and ~5% gravel up to 28mm. Sand is subangular to subrounded and gravel is subangular to rounded. Fines have medium plasticity, medium toughness, low dry strength, are reddish brown (5YR 5/4), and a strong reaction to HCL. <b>UBFU</b>		<b>Well Registry ID:</b> 55-226789 <b>Surface Completion:</b> Locking Well Vault & Concrete Pad <b>Well casing stickup:</b> 3.0 feet als <b>COLOR IDENTIFICATION</b> <b>MADE WITH WET SAMPLES</b> <b>USING MUNSELL CHART</b>	
5		SM	5	<b>SILTY SAND (5-20 feet)</b> Primarily fine to medium sand with ~25% fines and ~10% gravel up to 18mm. Sand is subangular to rounded and gravel is subangular to subrounded. Fines are nonplastic, low toughness, low dry strength, are reddish brown (5YR 5/4), and a weak reaction to HCL. <b>UBFU</b>			
10							
15							
20		SM	20	<b>SILTY SAND with GRAVEL (20-35 feet)</b> Primarily coarse to fine sand with ~25% fines and ~20% gravel up to 230mm. Sand is subangular to subrounded and gravel is subangular to rounded. Fines are nonplastic, low toughness, low dry strength, are reddish brown (5.5YR 5/4), and a weak reaction to HCL. <b>UBFU</b>		<b>Surface Casing:</b> 14-inch Low Carbon steel; 0 - 20 feet <b>Well Casing:</b> Nominal 5-inch diameter mild steel blank; -3.0 - 328 feet	
25							
30							
35		ML	35	<b>SANDY SILT (35-40 feet)</b> Primarily fines with ~30% sands and trace gravel up to 8mm. Sand is subangular to subrounded and gravel is subangular to subrounded. Fines are nonplastic, medium toughness, low dry strength, are reddish brown (5YR 4/4), and a weak reaction to HCL. <b>UBFU</b>			
40		SP-SM	40	<b>POORLY GRADED SAND with SILT (40-50 feet)</b> Primarily coarse to fine sand with ~10% fines and ~5% gravel up to 14mm. Sand is subrounded to angular and gravel is subangular to rounded. Fines are nonplastic, no toughness, no dry strength, (7.5YR 5/3), and a weak reaction to HCL. <b>UBFU</b>			
45							
50		SC	50	<b>CLAYEY SAND (50-70 feet)</b> Primarily fine to medium sand with ~35% fines. Sand is subrounded to angular with max size up to 4mm. Fines have low plasticity, low toughness, medium dry strength, (7.5YR 5/3), and a weak reaction to HCL. <b>UBFU</b>		<b>Unit Intervals:</b> UBFU: 0 -282 feet MGFU: 282 - 302 feet LBFU: 302 -445 feet	
55							
60							
65							
70		SM	70	<b>SILTY SAND (70-105 feet)</b> Primarily fine sand with ~25% fines and ~5% gravel up to 8mm. Sand is subrounded to angular and gravel is subangular to subrounded. Fines have low plasticity, low toughness, low dry strength, (7.5YR 5/3), and a weak reaction to HCL. <b>UBFU</b>			
75							
NOTE: Lithologic descriptions, group symbols, and grain-size determinations based on the USCS visual-manual method (Haley & Aldrich OP2001A - Field Practice for Soil Identification and Description).						MW01-LBF	



Depth (ft)	Elevation	USCS Symbol	Stratum Change Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION
75				
	-1400			
80				
	-1395			
85				
	-1390			
90				
	-1385			
95				
	-1380			
100				
	-1375			
105		SM	105	<b>SILTY SAND (105-200 feet)</b> Primarily fine to medium sand with ~20% fines. Sand is subrounded to angular and a max size up to 4mm. Fines have low plasticity, low toughness, low dry strength, (7.5YR 5/3), and no reaction to HCL. <b>UBFU</b>
	-1370			
110				
	-1365			
115				
	-1360			
120				
	-1355			
125				
	-1350			
130				
	-1345			
135				
	-1340			
140				
	-1335			
145				
	-1330			
150				
	-1325			
155				
	-1320			
160				

Seal: Type V neat cement 0 - 310  
feet Fine sand/bentonite 310 - 320  
feet

NOTE: Lithologic descriptions, group symbols, and grain-size determinations based on the USCS visual-manual method (Haley & Aldrich OP2001A - Field Practice for Soil Identification and Description).

MW01-LBF

Depth (ft)	Elevation	USCS Symbol	Stratum Change Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION
-1315				
-165				
-1310				
-170				
-1305				
-175				
-1300				
-180				
-1295				
-185				
-1290				
-190				
-1285				
-195				
-1280				
-200			200	
-1275		SW- SM		<b>WELL GRADED SAND with SILT (200-255 feet)</b> Primarily fine to coarse sand with ~10% fines and trace gravel up to 6mm. Sand is subrounded to angular. Fines are nonplastic, no toughness, low dry strength, (7.5YR 5/4), and a moderate reaction to HCL. UBFU
-205				
-1270				
-210				
-1265				
-215				
-1260				
-220				
-1255				
-225				
-1250				
-230				
-1245				
-235				
-1240				
-240				
-1235				
-245				
-1230				

NOTE: Lithologic descriptions, group symbols, and grain-size determinations based on the USCS visual-manual method (Haley & Aldrich OP2001A - Field Practice for Soil Identification and Description).

MW01-LBF

H:\LITHOLOG-PHOENIX-NO WELL HA-LIB09-PHX GLB LITHOLOGIC REPORT DATATEMPLATE+GDT \\HALEY\ALDRICH\COMMON\129687\GINT\129687-LITH\_KF.GPJ 31 Aug 18

HALEY ALDRICH				LITHOLOGIC LOG	MW01-LBF
				File No. 129687 Sheet No. 4 of 6	
Depth (ft)	Elevation	USCS Symbol	Stratum Change Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION	
-250	-1225				
-255	-1220	SW- SM	255	<b>WELL GRADED SAND with SILT (255-270 feet)</b> Primarily fine to coarse sand with ~ 5% fines and a max size up to 4mm. Sand is subrounded to angular. Fines are nonplastic, no toughness, low dry strength, (7.5YR 5/4), and a weak reaction to HCL. <b>UBFU</b>	
-260	-1215				
-265	-1210				
-270	-1205	SW- SM	270	<b>WELL GRADED SAND with SILT (270-445 feet)</b> Primarily fine to medium sand with ~ 10% fines and trace gravel up to 6mm. Sand is subrounded to angular and gravel is subrounded. Fines are nonplastic, no toughness, low dry strength, (7.5YR 5/4), and a strong reaction to HCL. <b>MGFU</b>	
-275	-1200				
-280	-1195				
-285	-1190				
-290	-1185				
-295	-1180				
-300	-1175				
-305	-1170				
-310	-1165				
-315	-1160				
-320	-1155				
-325	-1150				
-330	-1145				
-335			335		
					<b>Filter Pack:</b> No. 60 Colorado Silica Sand 320 - 445 feet <b>Thread</b> <b>Adapter:</b> Stainless Steel, SCH 80 F480 PVC to Mild Steel; 329 feet
NOTE: Lithologic descriptions, group symbols, and grain-size determinations based on the USCS visual-manual method (Haley & Aldrich OP2001A - Field Practice for Soil Identification and Description).					MW01-LBF

Depth (ft)	Elevation	USCS Symbol	Stratum Change Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION	
1140		SW- SM		<u>WELL GRADED SAND with SILT</u> (270-445 feet) Continued	<b>Well Screen:</b> Nominal 5-inch diameter, SCH 80 PVC Screen (0.020-inch slots); 330 - 440 feet
340					
1135					
345					
1130					
350					
1125					
355					
1120					
360					
1115					
365					
1110					
370					
1105					
375					
1100					
380					
1095					
385					
1090					
390					
1085					
395					
1080					
400					
1075					
405					
1070					
410					
1065					
415					
1060					
420					
			422		

NOTE: Lithologic descriptions, group symbols, and grain-size determinations based on the USCS visual-manual method (Haley & Aldrich OP2001A - Field Practice for Soil Identification and Description).

MW01-LBF

Depth (ft)	Elevation	USCS Symbol	Stratum Change Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION	
1055		SW- SM		<u>WELL GRADED SAND with SILT</u> (270-445 feet) Continued	
425					
1050					
430					
1045					
435					
1040					
440					
1035					
445			445		<b>Total Depth:</b> Driller Depth = 445 feet
NOTE: Lithologic descriptions, group symbols, and grain-size determinations based on the USCS visual-manual method (Haley & Aldrich OP2001A - Field Practice for Soil Identification and Description).					MW01-LBF



## **APPENDIX C**

### **Chemical Characteristics of Formation Water**



May 23, 2018

Barbara Sylvester  
Brown & Caldwell  
201 E. Washington Suite 500  
Phoenix, AZ 85004

TEL (602) 567-3894  
FAX -

Work Order No.: 18D0619  
Order Name: Florence Copper

RE: PTF

Dear Barbara Sylvester,

Turner Laboratories, Inc. received 2 sample(s) on 04/25/2018 for the analyses presented in the following report.

All results are intended to be considered in their entirety, and Turner Laboratories, Inc. is not responsible for use of less than the complete report. Results apply only to the samples analyzed. Samples will be disposed of 30 days after issue of our report unless special arrangements are made.

The pages that follow may contain sensitive, privileged or confidential information intended solely for the addressee named above. If you receive this message and are not the agent or employee of the addressee, this communication has been sent in error. Please do not disseminate or copy any of the attached and notify the sender immediately by telephone. Please also return the attached sheet(s) to the sender by mail.

Please call if you have any questions.

Respectfully submitted,

Turner Laboratories, Inc.  
ADHS License AZ0066

Kevin Brim  
Project Manager

Client: Brown & Caldwell  
Project: PTF  
Work Order: 18D0619  
Date Received: 04/25/2018

Order: Florence Copper

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collection Date/Time
18D0619-01	R-09	Ground Water	04/23/2018 1555
18D0619-02	TB	Ground Water	04/25/2018 0000

**Client:** Brown & Caldwell  
**Project:** PTF  
**Work Order:** 18D0619  
**Date Received:** 04/25/2018

**Case Narrative**

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The 8015D analysis was performed by TestAmerica Laboratories, Inc. in Phoenix, AZ.

The radiochemistry analysis was performed by Radiation Safety Engineering, Inc. in Chandler, AZ.

D5 Minimum Reporting Limit (MRL) is adjusted due to sample dilution; analyte was non-detect in the sample.

H5 This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.

M3 The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to the spike level. The associated LCS/LCSD recovery was acceptable.

All soil, sludge, and solid matrix determinations are reported on a wet weight basis unless otherwise noted.

ND Not Detected at or above the PQL

PQL Practical Quantitation Limit

DF Dilution Factor

PRL Project Reporting Limit



Client: Brown & Caldwell  
Project: PTF  
Work Order: 18D0619  
Lab Sample ID: 18D0619-01

Client Sample ID: R-09  
Collection Date/Time: 04/23/2018 1555  
Matrix: Ground Water  
Order Name: Florence Copper

Analyses	Result	PRL	PQL	Qual	Units	DF	Prep Date	Analysis Date	Analyst
ICP Dissolved Metals-E 200.7 (4.4)									
Calcium	140		4.0	M3	mg/L	1	04/27/2018 1440	05/04/2018 1150	MH
Iron	ND		0.30		mg/L	1	04/27/2018 1440	05/04/2018 1150	MH
Magnesium	27		3.0		mg/L	1	04/27/2018 1440	05/04/2018 1150	MH
Potassium	6.8		5.0		mg/L	1	04/27/2018 1440	05/04/2018 1150	MH
Sodium	170		5.0	M3	mg/L	1	04/27/2018 1440	05/04/2018 1150	MH
ICP/MS Dissolved Metals-E 200.8 (5.4)									
Aluminum	ND		0.0800	D5	mg/L	2	04/27/2018 1440	05/07/2018 1139	MH
Antimony	ND		0.00050		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Arsenic	0.0016		0.00050		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Barium	0.071		0.00050		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Beryllium	ND		0.00050	D5	mg/L	2	04/27/2018 1440	05/07/2018 1139	MH
Cadmium	ND		0.00025		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Chromium	0.0051		0.00050		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Cobalt	ND		0.00025		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Copper	0.011		0.00050		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Lead	ND		0.00050		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Manganese	0.0020		0.00025		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Nickel	0.0033		0.00050		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Selenium	ND		0.0025		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Thallium	ND		0.00050		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
Zinc	ND		0.040		mg/L	1	04/27/2018 1440	05/07/2018 1133	MH
CVAA Dissolved Mercury-E 245.1									
Mercury	ND		0.0010		mg/L	1	04/26/2018 0955	04/26/2018 1639	MH
pH-E150.1									
pH (pH Units)	7.8			H5	-	1	04/26/2018 1615	04/26/2018 1616	AP
Temperature (°C)	22			H5	-	1	04/26/2018 1615	04/26/2018 1616	AP
ICP/MS Total Metals-E200.8 (5.4)									
Uranium	0.016		0.00050		mg/L	1	04/27/2018 1230	04/30/2018 1348	MH

Client:

Project:

Work Order:

Lab Sample ID:

Brown & Caldwell

PTF

18D0619

18D0619-01

Client Sample ID: R-09

Collection Date/Time: 04/23/2018 1555

Matrix: Ground Water

Order Name: Florence Copper

Analyses	Result	PRL	PQL	Qual	Units	DF	Prep Date	Analysis Date	Analyst
Anions by Ion Chromatography-E300.0 (2.1)									
Chloride	310		25		mg/L	25	04/26/2018 1225	04/26/2018 1415	AP
Fluoride	ND		0.50		mg/L	1	04/25/2018 1208	04/25/2018 1544	AP
Nitrogen, Nitrate (As N)	8.8		0.50		mg/L	1	04/25/2018 1208	04/25/2018 1544	AP
Nitrogen, Nitrite (As N)	ND		0.10		mg/L	1	04/25/2018 1208	04/25/2018 1544	AP
Sulfate	190		130		mg/L	25	04/26/2018 1225	04/26/2018 1415	AP
Cyanide-E335.4									
Cyanide	ND		0.10		mg/L	1	04/26/2018 0845	04/30/2018 1545	AP
Alkalinity-SM2320B									
Alkalinity, Bicarbonate (As CaCO3)	150		2.0		mg/L	1	05/03/2018 1030	05/03/2018 1210	EJ
Alkalinity, Carbonate (As CaCO3)	ND		2.0		mg/L	1	05/03/2018 1030	05/03/2018 1210	EJ
Alkalinity, Hydroxide (As CaCO3)	ND		2.0		mg/L	1	05/03/2018 1030	05/03/2018 1210	EJ
Alkalinity, Phenolphthalein (As CaCO3)	ND		2.0		mg/L	1	05/03/2018 1030	05/03/2018 1210	EJ
Alkalinity, Total (As CaCO3)	150		2.0		mg/L	1	05/03/2018 1030	05/03/2018 1210	EJ
Specific Conductance-SM2510 B									
Conductivity	1700		0.20		µmhos/cm	2	05/09/2018 1315	05/09/2018 1330	AP
Total Dissolved Solids (Residue, Filterable)-SM2540 C									
Total Dissolved Solids (Residue, Filterable)	1000		20		mg/L	1	04/26/2018 0826	05/01/2018 1600	EJ
Volatile Organic Compounds by GC/MS-SW8260B									
Benzene	ND		0.50		ug/L	1	05/07/2018 1824	05/07/2018 1943	KP
Carbon disulfide	ND		2.0		ug/L	1	05/07/2018 1824	05/07/2018 1943	KP
Ethylbenzene	ND		0.50		ug/L	1	05/07/2018 1824	05/07/2018 1943	KP
Toluene	ND		0.50		ug/L	1	05/07/2018 1824	05/07/2018 1943	KP
Xylenes, Total	ND		1.5		ug/L	1	05/07/2018 1824	05/07/2018 1943	KP
Surr: 4-Bromofluorobenzene	95	70-130			%REC	1	05/07/2018 1824	05/07/2018 1943	KP
Surr: Dibromofluoromethane	101	70-130			%REC	1	05/07/2018 1824	05/07/2018 1943	KP
Surr: Toluene-d8	77	70-130			%REC	1	05/07/2018 1824	05/07/2018 1943	KP

Client:

Project:

Work Order:

Lab Sample ID:

Brown & Caldwell  
PTF  
18D0619  
18D0619-02

Client Sample ID: TB

Collection Date/Time: 04/25/2018 0000

Matrix: Ground Water

Order Name: Florence Copper

Analyses	Result	PRL	PQL	Qual	Units	DF	Prep Date	Analysis Date	Analyst
Volatile Organic Compounds by GC/MS-SW8260B									
Benzene	ND		0.50		ug/L	1	05/07/2018 1824	05/07/2018 2344	KP
Carbon disulfide	ND		2.0		ug/L	1	05/07/2018 1824	05/07/2018 2344	KP
Ethylbenzene	ND		0.50		ug/L	1	05/07/2018 1824	05/07/2018 2344	KP
Toluene	ND		0.50		ug/L	1	05/07/2018 1824	05/07/2018 2344	KP
Xylenes, Total	ND		1.5		ug/L	1	05/07/2018 1824	05/07/2018 2344	KP
Surr: 4-Bromofluorobenzene	101	70-130			%REC	1	05/07/2018 1824	05/07/2018 2344	KP
Surr: Dibromofluoromethane	110	70-130			%REC	1	05/07/2018 1824	05/07/2018 2344	KP
Surr: Toluene-d8	103	70-130			%REC	1	05/07/2018 1824	05/07/2018 2344	KP

Client: Brown & Caldwell  
Project: PTF  
Work Order: 18D0619  
Date Received: 04/25/2018

QC Summary

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch 1804269 - E 245.1										
Blank (1804269-BLK1)				Prepared & Analyzed: 04/26/2018						
Mercury	ND	0.0010	mg/L							
LCS (1804269-BS1)				Prepared & Analyzed: 04/26/2018						
Mercury	0.0049	0.0010	mg/L	0.005000		98	85-115			
LCS Dup (1804269-BSD1)				Prepared & Analyzed: 04/26/2018						
Mercury	0.0048	0.0010	mg/L	0.005000		95	85-115	2	20	
Matrix Spike (1804269-MS1)				Source: 18D0394-01			Prepared & Analyzed: 04/26/2018			
Mercury	0.0050	0.0010	mg/L	0.005000	0.00020	97	85-115			
Matrix Spike Dup (1804269-MSD1)				Source: 18D0394-01			Prepared & Analyzed: 04/26/2018			
Mercury	0.0050	0.0010	mg/L	0.005000	0.00020	96	85-115	1	20	
Batch 1804292 - E200.8 (5.4)										
Blank (1804292-BLK1)				Prepared & Analyzed: 04/30/2018						
Uranium	ND	0.00050	mg/L							
LCS (1804292-BS1)				Prepared & Analyzed: 04/30/2018						
Uranium	0.046	0.00050	mg/L	0.05000		92	85-115			
LCS Dup (1804292-BSD1)				Prepared & Analyzed: 04/30/2018						
Uranium	0.046	0.00050	mg/L	0.05000		92	85-115	0.2	20	
Matrix Spike (1804292-MS1)				Source: 18D0614-01			Prepared & Analyzed: 04/30/2018			
Uranium	0.051	0.00050	mg/L	0.05000	0.0015	99	70-130			
Batch 1805051 - E 200.7 (4.4)										
Blank (1805051-BLK1)				Prepared & Analyzed: 05/04/2018						
Calcium	ND	4.0	mg/L							
Iron	ND	0.30	mg/L							
Magnesium	ND	3.0	mg/L							
Potassium	ND	5.0	mg/L							
Sodium	ND	5.0	mg/L							
LCS (1805051-BS1)				Prepared & Analyzed: 05/04/2018						
Calcium	11	4.0	mg/L	10.00		109	85-115			
Iron	1.0	0.30	mg/L	1.000		104	85-115			
Magnesium	10	3.0	mg/L	10.00		105	85-115			
Potassium	10	5.0	mg/L	10.00		105	85-115			
Sodium	10	5.0	mg/L	10.00		105	85-115			
LCS Dup (1805051-BSD1)				Prepared & Analyzed: 05/04/2018						
Calcium	11	4.0	mg/L	10.00		110	85-115	1	20	
Iron	1.0	0.30	mg/L	1.000		105	85-115	0.5	20	
Magnesium	10	3.0	mg/L	10.00		105	85-115	0.06	20	
Potassium	10	5.0	mg/L	10.00		105	85-115	0.05	20	
Sodium	11	5.0	mg/L	10.00		109	85-115	4	20	

Client: Brown & Caldwell  
Project: PTF  
Work Order: 18D0619  
Date Received: 04/25/2018

QC Summary

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch 1805051 - E 200.7 (4.4)										
Matrix Spike (1805051-MS1)		Source: 18D0619-01		Prepared & Analyzed: 05/04/2018						
Calcium	150	4.0	mg/L	10.00	140	59	70-130			M3
Iron	1.1	0.30	mg/L	1.000	0.028	105	70-130			
Magnesium	38	3.0	mg/L	10.00	27	108	70-130			
Potassium	17	5.0	mg/L	10.00	6.8	105	70-130			
Sodium	170	5.0	mg/L	10.00	170	30	70-130			M3
Matrix Spike (1805051-MS2)		Source: 18E0021-01		Prepared & Analyzed: 05/04/2018						
Calcium	64	4.0	mg/L	10.00	54	103	70-130			
Iron	1.0	0.30	mg/L	1.000	0.0060	101	70-130			
Magnesium	21	3.0	mg/L	10.00	11	99	70-130			
Potassium	15	5.0	mg/L	10.00	4.7	104	70-130			
Sodium	99	5.0	mg/L	10.00	90	87	70-130			
Batch 1805069 - E 200.8 (5.4)										
Blank (1805069-BLK1)		Prepared & Analyzed: 05/07/2018								
Aluminum	ND	0.0400	mg/L							
Antimony	ND	0.00050	mg/L							
Arsenic	ND	0.00050	mg/L							
Barium	ND	0.00050	mg/L							
Beryllium	ND	0.00025	mg/L							
Cadmium	ND	0.00025	mg/L							
Chromium	ND	0.00050	mg/L							
Cobalt	ND	0.00025	mg/L							
Copper	ND	0.00050	mg/L							
Lead	ND	0.00050	mg/L							
Manganese	ND	0.00025	mg/L							
Nickel	ND	0.00050	mg/L							
Selenium	ND	0.0025	mg/L							
Thallium	ND	0.00050	mg/L							
Zinc	ND	0.040	mg/L							
LCS (1805069-BS1)		Prepared & Analyzed: 05/07/2018								
Aluminum	0.104	0.0400	mg/L	0.1000		104	85-115			
Antimony	0.048	0.00050	mg/L	0.05000		96	85-115			
Arsenic	0.050	0.00050	mg/L	0.05000		100	85-115			
Barium	0.050	0.00050	mg/L	0.05000		100	85-115			
Beryllium	0.049	0.00025	mg/L	0.05000		97	85-115			
Cadmium	0.050	0.00025	mg/L	0.05000		100	85-115			
Chromium	0.051	0.00050	mg/L	0.05000		102	85-115			
Cobalt	0.051	0.00025	mg/L	0.05000		101	85-115			
Copper	0.051	0.00050	mg/L	0.05000		103	85-115			
Lead	0.049	0.00050	mg/L	0.05000		98	85-115			
Manganese	0.050	0.00025	mg/L	0.05000		101	85-115			
Nickel	0.051	0.00050	mg/L	0.05000		102	85-115			
Selenium	0.051	0.0025	mg/L	0.05000		103	85-115			
Thallium	0.050	0.00050	mg/L	0.05000		101	85-115			
Zinc	0.10	0.040	mg/L	0.1000		101	85-115			



Client: Brown & Caldwell  
Project: PTF  
Work Order: 18D0619  
Date Received: 04/25/2018

QC Summary

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch 1805069 - E 200.8 (5.4)										
LCS Dup (1805069-BSD1)				Prepared & Analyzed: 05/07/2018						
Aluminum	0.115	0.0400	mg/L	0.1000		115	85-115	10	20	
Antimony	0.048	0.00050	mg/L	0.05000		96	85-115	0.7	20	
Arsenic	0.050	0.00050	mg/L	0.05000		101	85-115	0.8	20	
Barium	0.051	0.00050	mg/L	0.05000		102	85-115	1	20	
Beryllium	0.049	0.00025	mg/L	0.05000		97	85-115	0.2	20	
Cadmium	0.050	0.00025	mg/L	0.05000		100	85-115	0.2	20	
Chromium	0.051	0.00050	mg/L	0.05000		102	85-115	0.4	20	
Cobalt	0.050	0.00025	mg/L	0.05000		101	85-115	0.5	20	
Copper	0.052	0.00050	mg/L	0.05000		105	85-115	2	20	
Lead	0.049	0.00050	mg/L	0.05000		98	85-115	0.1	20	
Manganese	0.050	0.00025	mg/L	0.05000		101	85-115	0.09	20	
Nickel	0.051	0.00050	mg/L	0.05000		103	85-115	0.8	20	
Selenium	0.052	0.0025	mg/L	0.05000		104	85-115	2	20	
Thallium	0.050	0.00050	mg/L	0.05000		101	85-115	0.06	20	
Zinc	0.10	0.040	mg/L	0.1000		104	85-115	3	20	
Matrix Spike (1805069-MS1)				Source: 18D0693-01		Prepared & Analyzed: 05/07/2018				
Aluminum	0.239	0.0400	mg/L	0.1000	0.166	74	70-130			
Antimony	0.045	0.00050	mg/L	0.05000	0.00024	90	70-130			
Arsenic	0.056	0.00050	mg/L	0.05000	0.0035	104	70-130			
Barium	0.16	0.00050	mg/L	0.05000	0.12	94	70-130			
Beryllium	0.045	0.00025	mg/L	0.05000	0.000029	90	70-130			
Cadmium	0.047	0.00025	mg/L	0.05000	ND	94	70-130			
Chromium	0.049	0.00050	mg/L	0.05000	0.00052	98	70-130			
Cobalt	0.048	0.00025	mg/L	0.05000	0.00097	95	70-130			
Copper	0.051	0.00050	mg/L	0.05000	0.0020	98	70-130			
Lead	0.047	0.00050	mg/L	0.05000	0.00016	94	70-130			
Manganese	0.054	0.00025	mg/L	0.05000	0.0075	94	70-130			
Nickel	0.049	0.00050	mg/L	0.05000	0.0018	94	70-130			
Selenium	0.057	0.0025	mg/L	0.05000	ND	114	70-130			
Thallium	0.048	0.00050	mg/L	0.05000	0.000038	96	70-130			
Zinc	0.11	0.040	mg/L	0.1000	ND	109	70-130			

Client: Brown & Caldwell  
Project: PTF  
Work Order: 18D0619  
Date Received: 04/25/2018

QC Summary

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch 1804261 - SM2540 C										
Duplicate (1804261-DUP1)		Source: 18D0606-01		Prepared: 04/26/2018 Analyzed: 04/27/2018						
Total Dissolved Solids (Residue, Filterable)	630	20	mg/L		630			0.3	5	
Duplicate (1804261-DUP2)		Source: 18D0606-02		Prepared: 04/26/2018 Analyzed: 04/27/2018						
Total Dissolved Solids (Residue, Filterable)	610	20	mg/L		620			0.8	5	
Batch 1804268 - E335.4										
Blank (1804268-BLK1)		Prepared: 04/26/2018 Analyzed: 04/30/2018								
Cyanide	ND	0.10	mg/L							
LCS (1804268-BS1)		Prepared: 04/26/2018 Analyzed: 04/30/2018								
Cyanide	2.0	0.10	mg/L	2.000		101	90-110			
LCS Dup (1804268-BSD1)		Prepared: 04/26/2018 Analyzed: 04/30/2018								
Cyanide	2.0	0.10	mg/L	2.000		101	90-110	0.1	20	
Matrix Spike (1804268-MS1)		Source: 18D0602-03		Prepared: 04/26/2018 Analyzed: 04/30/2018						
Cyanide	2.1	0.10	mg/L	2.000	ND	103	90-110			
Matrix Spike Dup (1804268-MSD1)		Source: 18D0602-03		Prepared: 04/26/2018 Analyzed: 04/30/2018						
Cyanide	2.0	0.10	mg/L	2.000	ND	98	90-110	5	20	
Batch 1804272 - E150.1										
Duplicate (1804272-DUP1)		Source: 18D0662-02		Prepared & Analyzed: 04/26/2018						
pH (pH Units)	7.8		-		7.8			0.1	200	H5
Temperature (°C)	21		-		21			2	200	H5
Batch 1805027 - SM2320B										
LCS (1805027-BS1)		Prepared & Analyzed: 05/03/2018								
Alkalinity, Total (As CaCO3)	240	2.0	mg/L	250.0		96	90-110			
LCS Dup (1805027-BSD1)		Prepared & Analyzed: 05/03/2018								
Alkalinity, Total (As CaCO3)	240	2.0	mg/L	250.0		96	90-110	0	10	
Matrix Spike (1805027-MS1)		Source: 18D0606-02		Prepared & Analyzed: 05/03/2018						
Alkalinity, Total (As CaCO3)	370	2.0	mg/L	250.0	130	96	85-115			
Matrix Spike Dup (1805027-MSD1)		Source: 18D0606-02		Prepared & Analyzed: 05/03/2018						
Alkalinity, Total (As CaCO3)	370	2.0	mg/L	250.0	130	95	85-115	0.5	10	
Batch 1805103 - SM2510 B										
LCS (1805103-BS1)		Prepared & Analyzed: 05/09/2018								
Conductivity	140	0.10	µmhos/cm	141.2		101	0-200			
LCS Dup (1805103-BSD1)		Prepared & Analyzed: 05/09/2018								
Conductivity	140	0.10	µmhos/cm	141.2		101	0-200	0.7	200	
Duplicate (1805103-DUP1)		Source: 18E0192-01		Prepared & Analyzed: 05/09/2018						
Conductivity	4.0	0.10	µmhos/cm		4.0			0	10	

Client: Brown & Caldwell  
Project: PTF  
Work Order: 18D0619  
Date Received: 04/25/2018

QC Summary

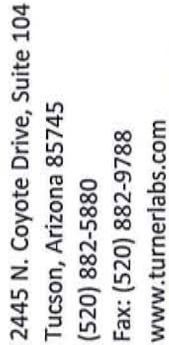
Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch 1805074 - SW8260B										
Blank (1805074-BLK1)				Prepared & Analyzed: 05/07/2018						
Benzene	ND	0.50	ug/L							
Carbon disulfide	ND	2.0	ug/L							
Ethylbenzene	ND	0.50	ug/L							
Toluene	ND	0.50	ug/L							
Xylenes, Total	ND	1.5	ug/L							
Surrogate: 4-Bromofluorobenzene	25.0		ug/L	25.00		100	70-130			
Surrogate: Dibromofluoromethane	26.9		ug/L	25.00		107	70-130			
Surrogate: Toluene-d8	25.1		ug/L	25.00		100	70-130			
LCS (1805074-BS1)				Prepared & Analyzed: 05/07/2018						
1,1-Dichloroethene	29		ug/L	25.00		114	70-130			
Benzene	27		ug/L	25.00		109	70-130			
Chlorobenzene	29		ug/L	25.00		115	70-130			
Toluene	25		ug/L	25.00		101	70-130			
Trichloroethene	26		ug/L	25.00		103	70-130			
Surrogate: 4-Bromofluorobenzene	24.6		ug/L	25.00		98	70-130			
Surrogate: Dibromofluoromethane	25.6		ug/L	25.00		102	70-130			
Surrogate: Toluene-d8	24.8		ug/L	25.00		99	70-130			
LCS Dup (1805074-BSD1)				Prepared & Analyzed: 05/07/2018						
1,1-Dichloroethene	27		ug/L	25.00		110	70-130	4	30	
Benzene	26		ug/L	25.00		104	70-130	5	30	
Chlorobenzene	26		ug/L	25.00		105	70-130	9	30	
Toluene	24		ug/L	25.00		96	70-130	5	30	
Trichloroethene	25		ug/L	25.00		98	70-130	4	30	
Surrogate: 4-Bromofluorobenzene	24.4		ug/L	25.00		98	70-130			
Surrogate: Dibromofluoromethane	26.1		ug/L	25.00		104	70-130			
Surrogate: Toluene-d8	25.1		ug/L	25.00		100	70-130			
Matrix Spike (1805074-MS1)		Source: 18D0582-02		Prepared & Analyzed: 05/07/2018						
1,1-Dichloroethene	27		ug/L	25.00	0.070	109	70-130			
Benzene	26		ug/L	25.00	0.020	104	70-130			
Chlorobenzene	26		ug/L	25.00	0.0	105	70-130			
Toluene	27		ug/L	25.00	3.5	95	70-130			
Trichloroethene	24		ug/L	25.00	0.040	97	70-130			
Surrogate: 4-Bromofluorobenzene	24.4		ug/L	25.00		98	70-130			
Surrogate: Dibromofluoromethane	26.4		ug/L	25.00		106	70-130			
Surrogate: Toluene-d8	24.9		ug/L	25.00		100	70-130			
Matrix Spike Dup (1805074-MSD1)		Source: 18D0582-02		Prepared & Analyzed: 05/07/2018						
1,1-Dichloroethene	27		ug/L	25.00	0.070	108	70-130	0.8	30	
Benzene	25		ug/L	25.00	0.020	101	70-130	2	30	
Chlorobenzene	26		ug/L	25.00	0.0	105	70-130	0.3	30	
Toluene	27		ug/L	25.00	3.5	95	70-130	0.1	30	
Trichloroethene	24		ug/L	25.00	0.040	95	70-130	2	30	
Surrogate: 4-Bromofluorobenzene	24.7		ug/L	25.00		99	70-130			
Surrogate: Dibromofluoromethane	26.4		ug/L	25.00		106	70-130			
Surrogate: Toluene-d8	25.3		ug/L	25.00		101	70-130			

Client: Brown & Caldwell  
Project: PTF  
Work Order: 18D0619  
Date Received: 04/25/2018

QC Summary

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch 1804245 - E300.0 (2.1)										
Blank (1804245-BLK1)				Prepared & Analyzed: 04/25/2018						
Chloride	ND	1.0	mg/L							
Fluoride	ND	0.50	mg/L							
Nitrogen, Nitrate (As N)	ND	0.50	mg/L							
Nitrogen, Nitrite (As N)	ND	0.10	mg/L							
Sulfate	ND	5.0	mg/L							
LCS (1804245-BS1)				Prepared & Analyzed: 04/25/2018						
Chloride	12	1.0	mg/L	12.50		92	90-110			
Fluoride	2.0	0.50	mg/L	2.000		101	90-110			
Nitrogen, Nitrate (As N)	4.7	0.50	mg/L	5.000		95	90-110			
Nitrogen, Nitrite (As N)	2.3	0.10	mg/L	2.500		92	90-110			
Sulfate	12	5.0	mg/L	12.50		96	90-110			
LCS Dup (1804245-BS1)				Prepared & Analyzed: 04/25/2018						
Chloride	12	1.0	mg/L	12.50		94	90-110	2	10	
Fluoride	2.0	0.50	mg/L	2.000		101	90-110	0.4	10	
Nitrogen, Nitrate (As N)	4.9	0.50	mg/L	5.000		98	90-110	3	10	
Nitrogen, Nitrite (As N)	2.4	0.10	mg/L	2.500		95	90-110	3	10	
Sulfate	12	5.0	mg/L	12.50		98	90-110	3	10	
Matrix Spike (1804245-MS1)		Source: 18D0613-08		Prepared & Analyzed: 04/25/2018						
Fluoride	3.7	0.50	mg/L	2.000	1.7	100	80-120			
Nitrogen, Nitrate (As N)	4.7	0.50	mg/L	5.000	0.22	89	80-120			
Matrix Spike (1804245-MS2)		Source: 18D0625-01		Prepared & Analyzed: 04/26/2018						
Nitrogen, Nitrate (As N)	5.0	0.50	mg/L	5.000	0.46	92	80-120			
Nitrogen, Nitrite (As N)	2.2	0.10	mg/L	2.500	ND	88	80-120			
Matrix Spike (1804245-MS3)		Source: 18D0614-01RE1		Prepared & Analyzed: 04/26/2018						
Chloride	17		mg/L	12.50	6.4	88	80-120			
Sulfate	28		mg/L	12.50	18	85	80-120			
Matrix Spike Dup (1804245-MSD1)		Source: 18D0613-08		Prepared & Analyzed: 04/25/2018						
Fluoride	3.7	0.50	mg/L	2.000	1.7	100	80-120	0.4	10	
Nitrogen, Nitrate (As N)	4.7	0.50	mg/L	5.000	0.22	90	80-120	0.6	10	
Matrix Spike Dup (1804245-MSD2)		Source: 18D0625-01		Prepared & Analyzed: 04/26/2018						
Nitrogen, Nitrate (As N)	5.1	0.50	mg/L	5.000	0.46	92	80-120	0.2	10	
Nitrogen, Nitrite (As N)	2.2	0.10	mg/L	2.500	ND	88	80-120	0.4	10	
Matrix Spike Dup (1804245-MSD3)		Source: 18D0614-01RE1		Prepared & Analyzed: 04/26/2018						
Chloride	18		mg/L	12.50	6.4	89	80-120	0.6	10	
Sulfate	29		mg/L	12.50	18	86	80-120	0.6	10	





TURNER WORK ORDER # 18D0619 DATE 4/23/18 PAGE 1 OF 1

Page 13 of 32

## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Phoenix

4625 East Cotton Ctr Blvd

Suite 189

Phoenix, AZ 85040

Tel: (602)437-3340

TestAmerica Job ID: 550-101943-1

Client Project/Site: 18D0619

For:

Turner Laboratories, Inc.

2445 North Coyote Drive

Suite 104

Tucson, Arizona 85745

Attn: Kevin Brim



Authorized for release by:

5/16/2018 12:23:25 PM

Ken Baker, Project Manager II

(602)659-7624

[ken.baker@testamericainc.com](mailto:ken.baker@testamericainc.com)

### LINKS

Review your project  
results through

TotalAccess

Have a Question?



Visit us at:

[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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## Definitions/Glossary

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

### Qualifiers

#### GC Semi VOA

Qualifier	Qualifier Description
Q9	Insufficient sample received to meet method QC requirements.

### Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)



# Case Narrative

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

**Job ID: 550-101943-1**

**Laboratory: TestAmerica Phoenix**

## Narrative

**Job Narrative**  
**550-101943-1**

### Comments

No additional comments.

### Receipt

The sample was received on 4/27/2018 10:50 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.8° C.

### GC Semi VOA

Method(s) 8015D: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate/sample duplicate (MS/MSD) associated with preparation batch 550-145985 and analytical batch 550-146884. Affected samples have been added a Q9 qualifier. 18D0619-01 (550-101943-1)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

### Organic Prep

Method(s) 3510C: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with 3510C.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

# Sample Summary

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
550-101943-1	18D0619-01	Water	04/23/18 15:55	04/27/18 10:50

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15

Detection Summary

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

Client Sample ID: 18D0619-01

Lab Sample ID: 550-101943-1

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
ORO (C22-C32)	0.21	Q9	0.20	mg/L	1		8015D	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Phoenix

# Client Sample Results

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

Client Sample ID: 18D0619-01

Date Collected: 04/23/18 15:55

Date Received: 04/27/18 10:50

Lab Sample ID: 550-101943-1

Matrix: Water

## Method: 8015D - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
ORO (C22-C32)	0.21	Q9	0.20	mg/L		04/30/18 14:16	05/10/18 23:29	1
DRO (C10-C22)	ND	Q9	0.10	mg/L		04/30/18 14:16	05/10/18 23:29	1
Surrogate	%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
o-Terphenyl (Surr)	79		10 - 150			04/30/18 14:16	05/10/18 23:29	1

# Surrogate Summary

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

Method: 8015D - Diesel Range Organics (DRO) (GC)

Matrix: Water

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)		
Lab Sample ID	Client Sample ID	OTPH (10-150)
550-101943-1	18D0619-01	79
LCS 550-145985/2-A	Lab Control Sample	79
LCSD 550-145985/3-A	Lab Control Sample Dup	79
MB 550-145985/1-A	Method Blank	65

Surrogate Legend

OTPH = o-Terphenyl (Surr)

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15



# QC Sample Results

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

## Method: 8015D - Diesel Range Organics (DRO) (GC)

Lab Sample ID: MB 550-145985/1-A

Matrix: Water

Analysis Batch: 146884

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 145985

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
ORO (C22-C32)	ND		0.20	mg/L		04/30/18 14:15	05/11/18 11:16	1
DRO (C10-C22)	ND		0.10	mg/L		04/30/18 14:15	05/11/18 11:16	1
Surrogate	MB %Recovery	MB Qualifier	Limits			Prepared	Analyzed	Dil Fac
o-Terphenyl (Surr)	65		10 - 150			04/30/18 14:15	05/11/18 11:16	1

Lab Sample ID: LCS 550-145985/2-A

Matrix: Water

Analysis Batch: 146884

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 145985

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
ORO (C22-C32)	1.60	1.59		mg/L		99	69 - 107
DRO (C10-C22)	0.400	0.450		mg/L		113	42 - 133
Surrogate	LCS %Recovery	LCS Qualifier	Limits				
o-Terphenyl (Surr)	79		10 - 150				

Lab Sample ID: LCSD 550-145985/3-A

Matrix: Water

Analysis Batch: 146884

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 145985

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
ORO (C22-C32)	1.60	1.59		mg/L		100	69 - 107	0	20
DRO (C10-C22)	0.400	0.447		mg/L		112	42 - 133	1	22
Surrogate	LCSD %Recovery	LCSD Qualifier	Limits						
o-Terphenyl (Surr)	79		10 - 150						

TestAmerica Phoenix

## QC Association Summary

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

### GC Semi VOA

#### Prep Batch: 145985

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-101943-1	18D0619-01	Total/NA	Water	3510C	
MB 550-145985/1-A	Method Blank	Total/NA	Water	3510C	
LCS 550-145985/2-A	Lab Control Sample	Total/NA	Water	3510C	
LCSD 550-145985/3-A	Lab Control Sample Dup	Total/NA	Water	3510C	

#### Analysis Batch: 146884

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
550-101943-1	18D0619-01	Total/NA	Water	8015D	145985
MB 550-145985/1-A	Method Blank	Total/NA	Water	8015D	145985
LCS 550-145985/2-A	Lab Control Sample	Total/NA	Water	8015D	145985
LCSD 550-145985/3-A	Lab Control Sample Dup	Total/NA	Water	8015D	145985

# Lab Chronicle

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

**Client Sample ID: 18D0619-01**

**Date Collected: 04/23/18 15:55**

**Date Received: 04/27/18 10:50**

**Lab Sample ID: 550-101943-1**

**Matrix: Water**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			145985	04/30/18 14:16	REM	TAL PHX
Total/NA	Analysis	8015D		1	146884	05/10/18 23:29	TC1	TAL PHX

## Laboratory References:

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340

Accreditation/Certification Summary

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

Laboratory: TestAmerica Phoenix

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arizona	State Program	9	AZ0728	06-09-18
Analysis Method	Prep Method	Matrix	Analyte	

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
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- 10
- 11
- 12
- 13
- 14
- 15

# Method Summary

Client: Turner Laboratories, Inc.  
Project/Site: 18D0619

TestAmerica Job ID: 550-101943-1

Method	Method Description	Protocol	Laboratory
8015D	Diesel Range Organics (DRO) (GC)	SW846	TAL PHX
3510C	Liquid-Liquid Extraction (Separatory Funnel)	SW846	TAL PHX

## Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

## Laboratory References:

TAL PHX = TestAmerica Phoenix, 4625 East Cotton Ctr Blvd, Suite 189, Phoenix, AZ 85040, TEL (602)437-3340



# SUBCONTRACT ORDER

Turner Laboratories, Inc.

18D0619

101943

## SENDING LABORATORY:

Turner Laboratories, Inc.  
2445 N. Coyote Drive, Ste #104  
Tucson, AZ 85745  
Phone: 520.882.5880  
Fax: 520.882.9788  
Project Manager: Kevin Brim

## RECEIVING LABORATORY:

TestAmerica Phoenix  
4625 East Cotton Center Boulevard Suite 189  
Phoenix, AZ 85540  
Phone : (602) 437-3340  
Fax:  
Please CC Kevin Brim Kbrim@turnerlabs.com

## Analysis

## Expires

## Laboratory ID

## Comments

Sample ID: 18D0619-01 Drinking Water Sampled: 04/23/2018 15:55

8015D Sub

04/30/2018 15:55

8015D DRO and ORO Paramaters Only

Containers Supplied:

## 8015D Sub

o-Terphenyl  
C10-C32 (Total)  
C22-C32 (Oil Range Organics)  
C10-C22 (Diesel Range Organics)  
C6-C10 (Gasoline Range Organics)

550-101943 Chain of Custody



TA-PHX

3.8 L  
LPS  
GVR

Released By

Date

Received By

Date

Released By

Date

Received By

Date

## Login Sample Receipt Checklist

Client: Turner Laboratories, Inc.

Job Number: 550-101943-1

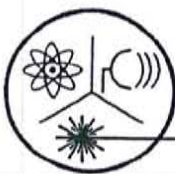
**Login Number: 101943**

**List Source: TestAmerica Phoenix**

**List Number: 1**

**Creator: Gravlin, Andrea**

Question	Answer	Comment
Radioactivity wasn't checked or is $\leq$ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	False	Check done at department level as required.



## Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121

Website: [www.radsafe.com](http://www.radsafe.com)

(480) 897-9459

FAX (480) 892-5446

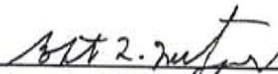
### Radiochemical Activity in Water (pCi/L)

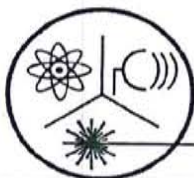
Turner Laboratories  
2445 N. Coyote Drive, Ste. 104  
Tucson, AZ 85745

Sampling Date: April 23, 2018  
Sample Received: May 01, 2018  
Analysis Completed: May 22, 2018

Sample ID	Gross Alpha Activity Method 600/00-02 (pCi/L)	Uranium Activity Method ASTM D6239 (pCi/L)	Adjusted Gross Alpha (pCi/L)	Radium 226 Activity Method GammaRay HPGE (pCi/L)	Radium 228 Activity Method GammaRay HPGE (pCi/L)	Total Radium (pCi/L)
18D0619-01	17.7 ± 0.9	12.9 ± 1.2	4.8 ± 1.5	3.1 ± 0.3	3.1 ± 0.4	6.2 ± 0.5

Date of Analysis	5/2/2018	5/21/2018	5/21/2018	5/4/2018	5/4/2018	5/4/2018
------------------	----------	-----------	-----------	----------	----------	----------

  
 Robert L. Metzger, Ph.D., C.H.P.      5/22/2018  
 Date  
 Laboratory License Number AZ0462



## Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121

Website: [www.radsafe.com](http://www.radsafe.com)

(480) 897-9459

FAX (480) 892-5446

### Isotopic Uranium Analysis

Turner Laboratories  
2445 N. Coyote Drive, Ste. 104  
Tucson, AZ 85745

Sampling Date: April 23, 2018

Sample Received: May 01, 2018

Uranium Analysis Date: May 21, 2018

Sample No.	$^{238}\text{U}$	$^{235}\text{U}$	$^{234}\text{U}$	Total	
18D0619-01	$6.0 \pm 0.6$	$0.280 \pm 0.004$	$6.6 \pm 0.6$	$12.9 \pm 1.2$	Activity (pCi/L)
	$17.9 \pm 1.7$	$0.131 \pm 0.002$	$0.00106 \pm 0.00010$	$18.0 \pm 1.7$	Content ( $\mu\text{g/L}$ )
	Comments:				

*Robert L. Metzger*  
Robert L. Metzger, Ph.D., C.H.P.

5/22/2018

Date

Laboratory License Number AZ0462

Arizona Department of Environmental Quality  
**Drinking Water Radionuclides-Adjusted Gross Alpha, Radium 226 & 228, Uranium Analysis Report**  
 \*\*\*Samples To Be Taken At Entry Point Into Distribution System (EPDS) Only\*\*\*

PWS ID#: AZ04

PWS Name: \_\_\_\_\_

April 23, 2018 15:55 (24 hour clock)

Sample Date

Sample Time

Owner/Contact Person

Owner/Contact Fax Number

Owner/Contact Phone Number

Sample Collection Point

☐ EPDS # \_\_\_\_\_**Compliance Sample Type:**☐

Reduced Monitoring

Date Q1 collected: \_\_\_\_\_

☐

Quarterly

Date Q2 collected: \_\_\_\_\_

☐

Composite of four quarterly samples

Date Q3 collected: \_\_\_\_\_

Date Q4 collected: \_\_\_\_\_

**\*\*\*RADIOCHEMICAL ANALYSIS\*\*\***

&gt;&gt;&gt;To be filled out by laboratory personnel&lt;&lt;&lt;

**\*\*\*Combined Uranium must be reported in micrograms per liter\*\*\***

Analysis Method	MCL	Reporting Limit	Contaminant Name	Cont. Code	Analyses Run Date	Result	Exceed MCL
	15 pCi/L		Adjusted Gross Alpha	4000	5/21/2018	4.8 ± 1.5	
600/00-02		3 pCi/L	Gross Alpha	4002	5/2/2018	17.7 ± 0.9	
7500 - Rn			Radon	4004			
ASTM D6239	30 µg/L	1 µg/L	Combined Uranium	4006	5/21/2018	18.0 ± 1.7 µg/L	
			Uranium 234	4007	5/21/2018	0.00106 ± 0.00010	
			Uranium 235	4008	5/21/2018	0.131 ± 0.002	
			Uranium 238	4009	5/21/2018	17.9 ± 1.7	
	5 pCi/L	1 pCi/L	Combined Radium (226,228)	4010	5/4/2018	6.2 ± 0.5	X
GammaRay HPGE		1 pCi/L	Radium 226	4020	5/4/2018	3.1 ± 0.3	
GammaRay HPGE		1 pCi/L	Radium 228	4030	5/4/2018	3.1 ± 0.4	

**\*\*\*LABORATORY INFORMATION\*\*\***

&gt;&gt;&gt;To be filled out by laboratory personnel&lt;&lt;&lt;

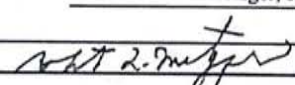
Specimen Number: RSE60312

Lab ID Number: AZ0462

Lab Name: Radiation Safety Engineering, Inc.

Printed Name and Phone Number of Laboratory Contact: Robert L. Metzger, Ph.D., C.H.P. (480) 897-9459

Comments: 18D0619-01

Authorized Signature: 

Date Public Water System Notified: \_\_\_\_\_

DWAR 6: 11/2007



## SUBCONTRACT ORDER

Turner Laboratories, Inc.

18D0619

SENDING LABORATORY:

Turner Laboratories, Inc.  
2445 N. Coyote Drive, Ste #104  
Tucson, AZ 85745  
Phone: 520.882.5880  
Fax: 520.882.9788  
Project Manager: Kevin Brim

RECEIVING LABORATORY:

Radiation Safety Engineering, Inc.  
3245 N. Washington St.  
Chandler, AZ 85225-1121  
Phone : (480) 897-9459  
Fax: (480) 892-5446  
Please CC Kevin Brim Kbrim@turnerlabs.com

Analysis	Expires	Laboratory ID	Comments
<hr/>			
Sample ID: 18D0619-01 Drinking Water Sampled: 04/23/2018 15:55			
Radiochemistry, Gross Alpha	10/20/2018 15:55		Analyze Uranium and Adjusted Alpha if G. Alpha is > 12
Radiochemistry, Radium 226/228	05/23/2018 15:55		
Containers Supplied:			

H 60312

Released By

Date

4/30/18

16:00

ups

Received By

4/30/18

Date

16:00

Released By

Date

Received By

Date

## **APPENDIX D**

### **Well Completion Documentation**

## PIPE TALLY

Project Name: <u>VOT</u>	Project No.:
Well No.: <u>MW-01 LBF</u>	Date: <u>12-19-17</u>
Location: <u>FLORENCE, AL</u>	Pipe Tally for:
Total Depth:	Geologist: <u>G. Foushee</u>

Type of Connections: ☐ Welded ☐ T+C ☐ Flush Thread ☐ Other

Pipe	✓	Length (ft)	Length Σ (ft)	Pipe Type	Dist. from sensor bottom to bottom of pipe (feet)	Sensor Type (ACD, CS, ERT)	Sensor ID	Wire Lead ID	Depth of Sensor (feet bgs)
1	✓	0.36	0.36	SS Endcap					
2	✓	19.99	20.35	0.02 slot sand					
3	X	19.99	40.34						
4	X	19.99	60.33						
5	X	19.99	80.32						
6		20.05	100.37						
7		10.02	110.39						
8	X	1.27	111.66	Xover PVC STEEL	111.66	FIELD STG			
9		20.00	131.66	BL. STEEL					
10	X	19.99	151.65						
11		20.00	171.65						
12		20.00	191.65						
13	X	19.99	211.64						
14		20.00	231.64						
15	X	19.99	251.63						
16		20.00	271.63						
17	X	19.99	291.62						
18		20.00	311.62						
19	X	19.99	331.61						
20		19.98	351.59						
21	X	20.02	371.61						
22		20.00	391.61						
23	X	20.00	411.61						
24		20.00	431.61						
25		20.00	451.61						

**Notes:**

SPID CAP 316 SS  
5" W 80 PVC, 0.020 SLOT, NOM  
5", 0.42' OD, 0.40' ID  
STEEL NOM 5", 0.42' OD, 0.4

## SUMMARY OF TALLY

Total Length tallied:		<u>451.61</u>
Casing Stick-Up:		<u>3.02</u>
Length of Casing Cut-Off:		<u>8.64</u>
Bottom of Well:		<u>439.95</u>
Screened Interval:	329.58 - 439.61	
Total Screen in Hole:		<u>110.03</u>

Sensor Types: Annular Conductivity Device (ACD), installed as pairs with 3 ft spacing  
Conductivity Sensor (CS) 4 sensors with sing lead 20 ft spacing  
Electrical Resistivity Tomography (ERT)

~~NOTE:~~ <sup>CUT OFF</sup> 8.64 temporary cutoff imp

# HALEY ALDRICH

# HALEY ALDRICH

\* RE-WRITE OF ORIGINAL DOCUMENT

## ESTIMATED ANNULAR MATERIAL RECORD

Project Name: <u>FC1</u>		Project #: <u>129687-607</u>		Date: <u>12.19.17</u>	
Well No.: <u>MW-01-UBF</u>		Geologist: <u>G. Fou 344 / 2. SM. TT4</u>			

**ANNULAR VOLUME CALCULATIONS**

Total Depth of Borehole [T]: 445 feet

Borehole Diameter [D]: 12 1/4 inches

Screen Length [L<sub>s</sub>]: 110 feet

Screen Diameter [d<sub>s</sub>]: 5.16 inches

Casing Length [L<sub>c</sub>]: 330 feet

Casing Diameter [d<sub>c</sub>]: 5.16 inches

Screen Annular Volume (A<sub>s</sub>): (D<sup>2</sup>-d<sub>s</sub><sup>2</sup>) 0.005454 = 0.67 Ft<sup>3</sup>/Lin. Ft

Casing Annular Volume (A<sub>c</sub>): (D<sup>2</sup>-d<sub>c</sub><sup>2</sup>) 0.005454 = 0.67 Ft<sup>3</sup>/Lin. Ft

Casing/Cam. Tube Annular Volume (A<sub>ct</sub>): (D<sup>2</sup>-d<sub>c</sub><sup>2</sup>-d<sub>ct</sub><sup>2</sup>) 0.005454 =          Ft<sup>3</sup>/Lin. Ft

**EQUATIONS**

2,700 lbs. Silica Sand = 1 cubic yard = 27 cubic feet

<sup>1</sup> Volume of bag (Ft<sup>3</sup>) = bag weight/100

<sup>2</sup> Calculated depth = Previous Calculated depth - (V/A)

Bentonite Sack = 0.69 ft<sup>3</sup>

Silica Sand Super Sack = 3000 lbs.

No.	Weight of Bag (lbs.)	Volume of Bag <sup>1</sup> (V) (ft <sup>3</sup> )	Total Vol. of Bags (ft <sup>3</sup> )	Calculated Depth <sup>2</sup> (ft. bls)	Tagged Depth (ft. bls)	Comments
1	6000	60	60	36.1	33.5	8-12 Super Sacks x 2
2	6666	66.67	666.6	32.5	328	5 gallon Buckets x 10
3	6666	66.67	73.7	320	320	5 gallon Buckets x 8
-	-	-	-	-	325	20 min Swab 435-370
-	-	-	-	-	326	10 min Swab 435-370
-	-	-	-	-	325	10 min Swab 435-370
4	6667	66.67	76.5	320	320	5 gallon #8 x 5

Project Name: FC1 PTF  
Project No.: 129687-007  
Date: 12-19-17  
Well No.: MW-01-CBF  
Geologist: Z. Smith

Project Name: FC1 PTF  
Well No.: MU-01-UBF

Project No.: 129687-367  
Date: 12-19-17

RECORD (continued)  
Geologist: Z. Smith

[illegible]


1/2" Pencil  
BENTONITE







58776435

Plant:	Begin Loading:	To Job:	Arrive Job:	Start Unload:	Finish Unload:	Leave Job:	Return Plant:
0034103							

Customer Code: Customer Name: Customer Job Number: Order Code / Date: 11/21/17

Project Code: Project Name: Project P.O. Number: Order P.O. Number:

Ticket Date: Delivery Address: BATCH RECORDS: C Map Page: Map/Row/Column:

Delivery Instructions: MAIN GATE\*\*S/SIDE OF HUNT HWY # W/O PINAL PKWY\*\* BRUSH DISPATCHER:

Ticket Number: 44102391

Due On Job:	Slump:	Truck Number:	Driver Number:	Driver Name:	End Use:
11.00	11.00	10035950		ERICKSON, KENNETH	BLDNG: OTHER

LOAD QUANTITY	CUMULATIVE QUANTITY	ORDERED QUANTITY	MATERIAL CODE	PRODUCTION DESCRIPTION	UOM	UNIT PRICE	AMOUNT
---------------	---------------------	------------------	---------------	------------------------	-----	------------	--------

8.00	8.00	8.00	1333049	TYPE 11/V SLURRY 21 SK CMT/H YD3			
1.00	2.00	2.00	1333360	PER DAY DELIVERY			

1247818	FUEL SURCHARGE ADJ	
1208763	ENVIRONMENTAL FEE	
1572392	FREIGHT NON TAXABLE ARIZONA	

<input type="checkbox"/> Cash	Check # / Auth Code:	Signature of Driver Receiving Cash:	Cash Received:	Total COD Order Amount to Collect Without Standby Charges:
<input type="checkbox"/> Check				
<input type="checkbox"/> Charge				

Comments:	WATER ADDED: _____ GAL	YARDS IN DRUM: _____
	WHEN ADDED.	
	SIGNATURE	
	CURB LINE CROSSED AT OWNER'S/AGENT'S REQUEST:	
		SIGNATURE
<input type="checkbox"/> LOAD WAS TESTED BY: _____		

Notice: Our drivers will make every effort to place materials where the customer designates, but the Company assumes no responsibility for damages inside curb or property line. Customer agrees to the terms of sale and delivery and accepts concrete as is. Due to important factors which are out of our control after delivery, this Company will not accept any responsibility for the finished results. No credit for returned concrete. Buyers exceptions and claims shall be deemed waived unless made to us in writing within one business day after the receipt of materials.

SPECIAL TERMS: Any water added is at customers own risk. If water is added on job, concrete strength is no longer guaranteed. WARNING: Product may cause skin and/or eye irritation. CAUTION: Material may be hazardous to your safety and health. Please refer to the backside of this ticket for important safety handling information, and to the material safety data sheets for additional information.

AUTHORIZED SIGNATURE:

ⓧ

## **APPENDIX E**

### **Geophysical Logs**

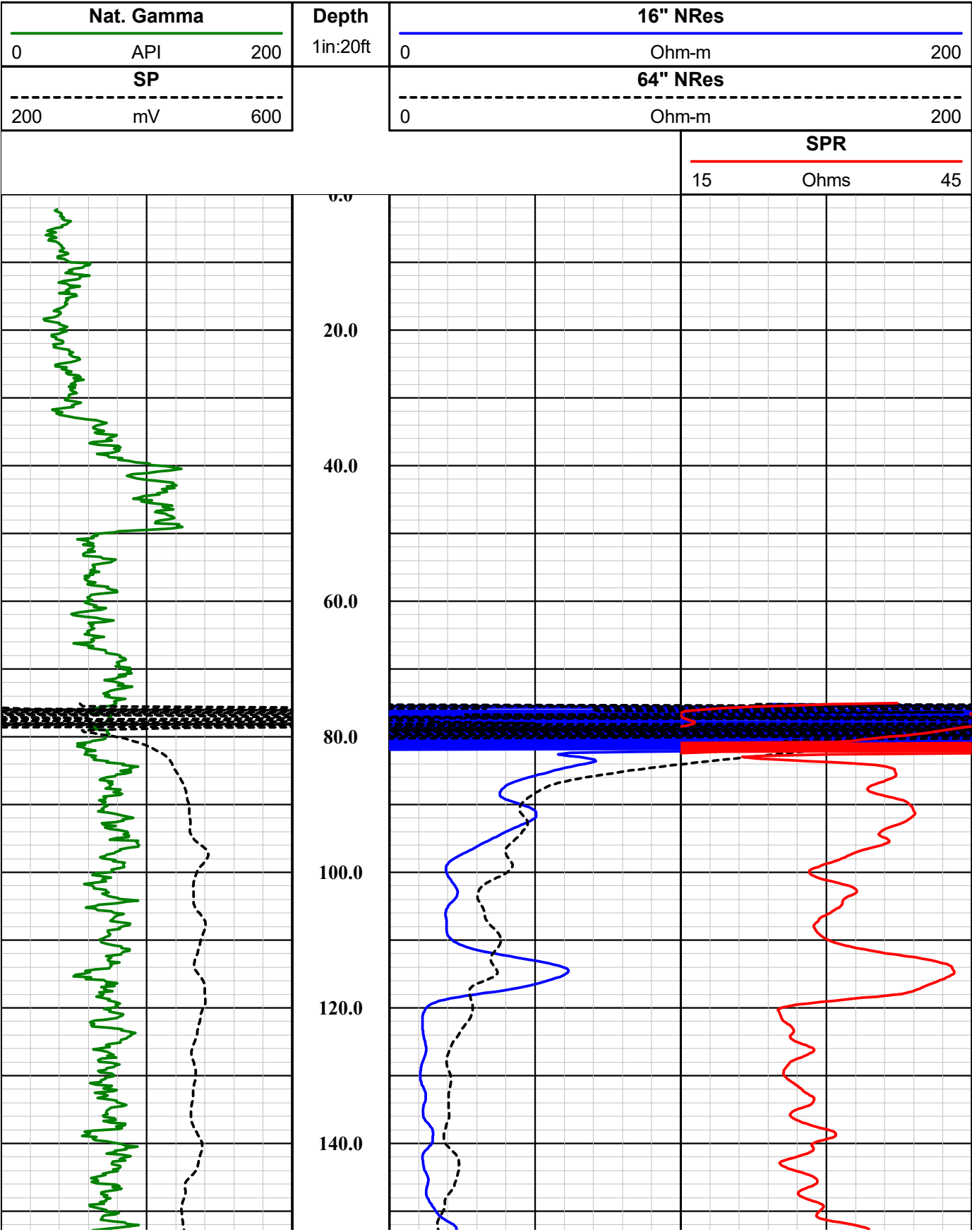


Tool Summary:					
Date	12-18-17	Date	12-18-17	Date	12-18-17
Run No.	1	Run No.	2	Run No.	3
Tool Model	MSI COMBO TOOL	Tool Model	MSI E-LOG 40GRP	Tool Model	MSI 60MM SONIC
Tool SN	5543	Tool SN	5019	Tool SN	5050
From	SURFACE	From	SURFACE	From	SURFACE
To	445 FT.	To	445 FT.	To	445 FT.
Recorded By	A. OLSON	Recorded By	A. OLSON	Recorded By	A. OLSON
Truck No	200	Truck No	200	Truck No	200
Operation Check	12-17-17	Operation Check	12-17-17	Operation Check	12-17-17
Calibration Check	12-17-17	Calibration Check	12-17-17	Calibration Check	N/A
Time Logged	8:35 P.M.	Time Logged	9:05 P.M.	Time Logged	9:30 P.M.
Date	12-18-17	Date		Date	
Run No.	4	Run No.	5	Run No.	6
Tool Model	MSI DEVIATION	Tool Model		Tool Model	
Tool SN	3082	Tool SN		Tool SN	
From	SURFACE	From		From	
To	445 FT.	To		To	
Recorded By	A. OLSON	Recorded By		Recorded By	
Truck No	200	Truck No		Truck No	
Operation Check	12-17-17	Operation Check		Operation Check	
Calibration Check	N/A	Calibration Check		Calibration Check	
Time Logged	10:15 P.M.	Time Logged		Time Logged	
Additional Comments:					
Caliper Arms Used: 15 IN. Calibration Points: 8 IN. & 23 IN.					

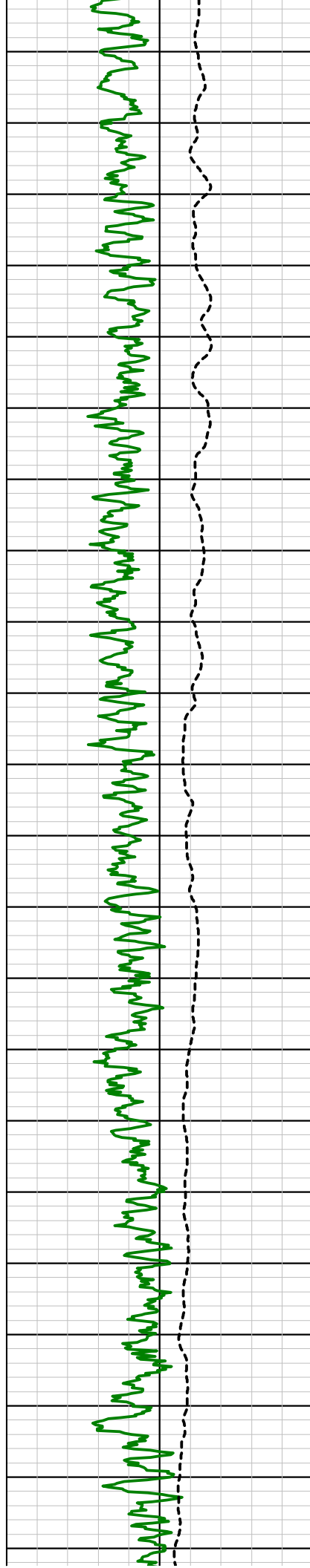


**Disclaimer:**

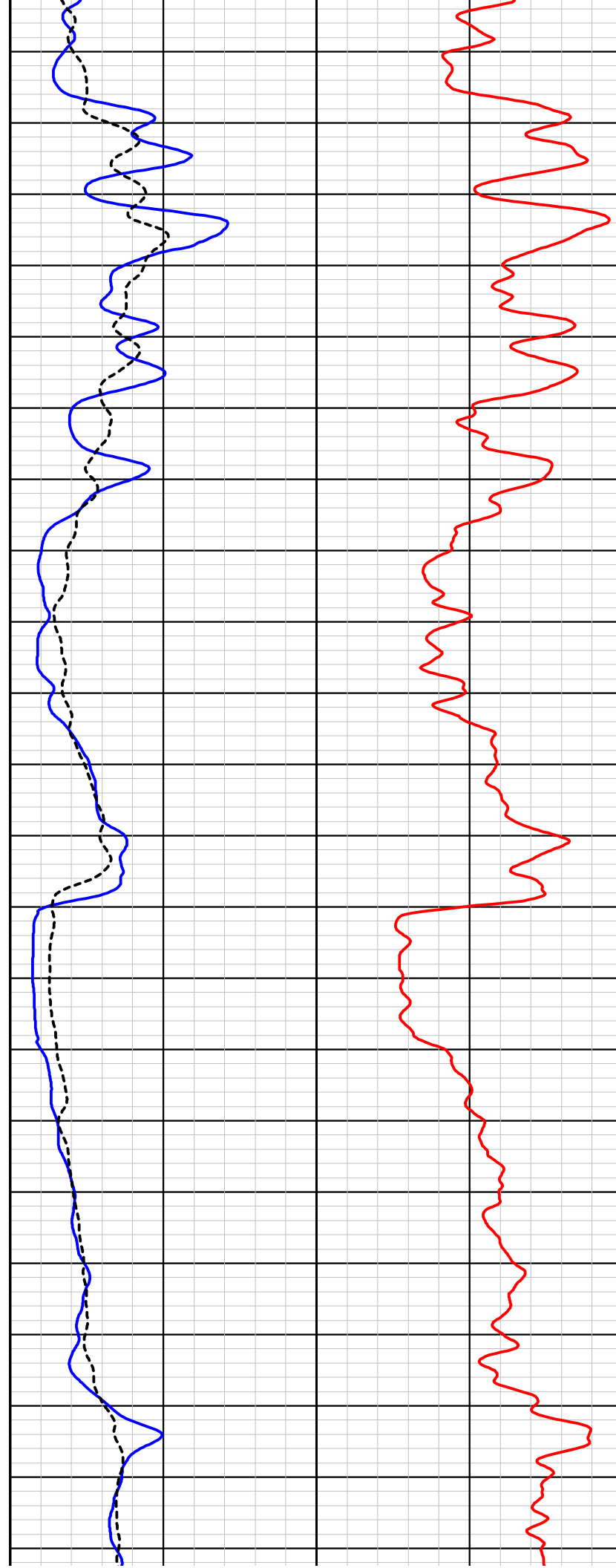
All interpretations of log data are opinions based on inferences from electrical or other measurements. We do not guarantee the accuracy or correctness of any interpretations or recommendations and shall not be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our employees or agents. These interpretations are also subject to our general terms and conditions set out in our current Service Invoice.

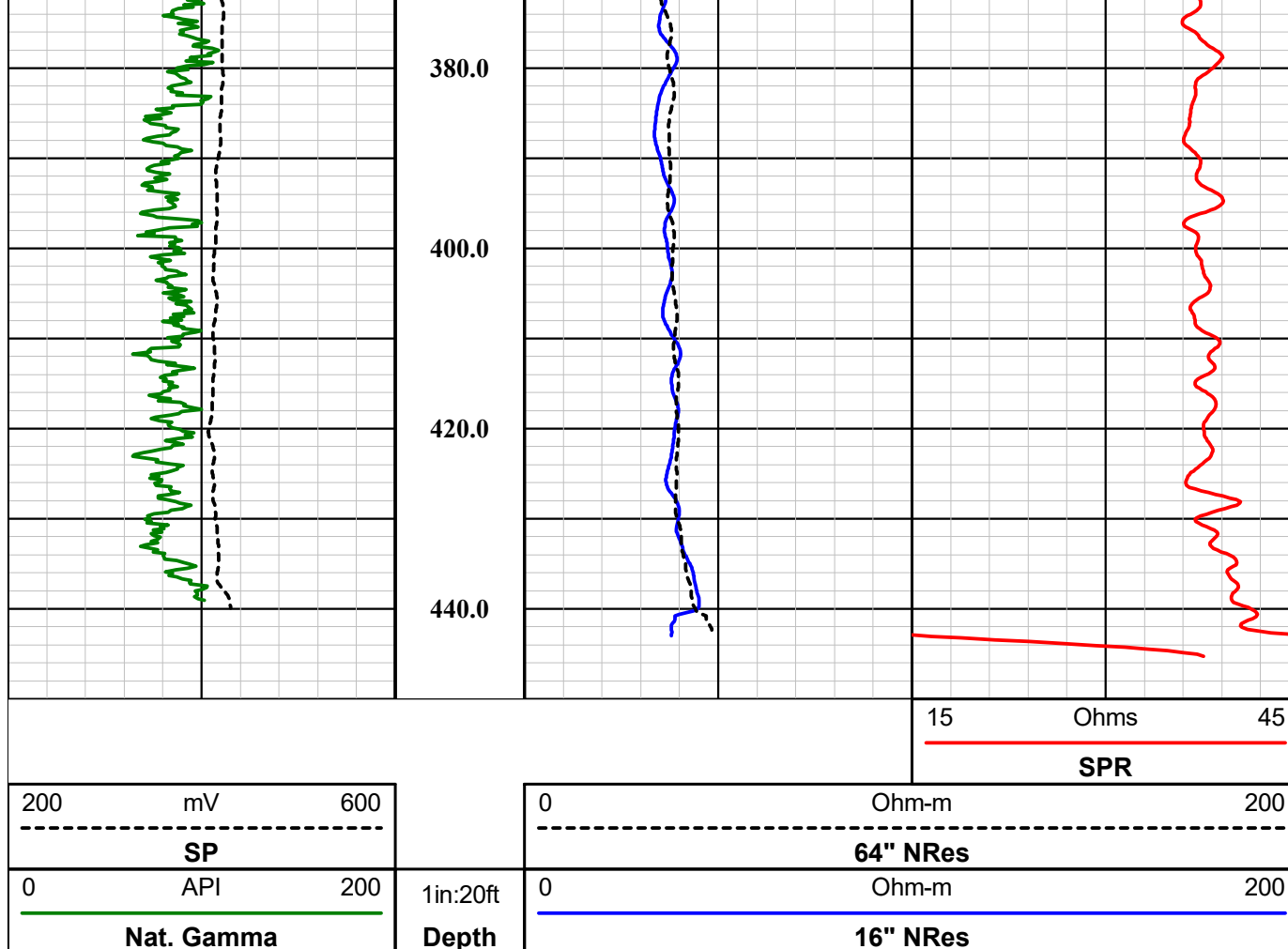






160.0  
180.0  
200.0  
220.0  
240.0  
260.0  
280.0  
300.0  
320.0  
340.0  
360.0





## MSI 40GRP E-Log Tool

Probe Top = Depth Ref.

Tool SN: 5019, 5513, & 5514



Four Conductor MSI Probe Top

Bridle connects to wireline cablehead: Wireline armor is the B Electrode.

Bridle Electrode (N Electrode)

Probe Length = 1.98 m or 6.5 ft

Bridle Length = 7.88 m or 25.86 ft

Probe Weight = 7.3 kg or 16.0 lbs

Can only be collected in fluid

Isolation Bridle

Temperature Rating: 70 Deg C (158 Deg F)

Pressure Rating: 200 bar (2900 psi)



64" Normal Resistivity Electrode/Spontaneous Potential Electrode (M Electrode)

Electrode Measuring Points (from bottom of probe)

Spontaneous Potential (SP): 1.777 m or 5.81 ft

16" Normal Resistivity (16" NRes): 0.3548 m or 1.16 ft

64" Normal Resistivity (64" NRes): 0.9644 m or 3.16 ft

Single Point Resistance (SPR): 0.152 m or 0.50 ft

Natural Gamma Ray (Nat. Gamma): 0.73 m or 2.39 ft

Natural Gamma Ray

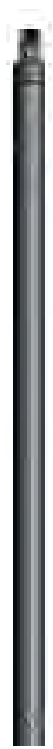
16" Normal Resistivity Electrode (M Electrode)

Current Electrode/Single Point Resistance Electrode (A Electrode)

1.63" or 40 mm Diameter (41.4 mm with neoprene heat shrink and electrical tape)

## MSI Gamma-Caliper-Temperature-Fluid Resistivity

Probe Top = Depth Ref.



Single Conductor MSI Probe Top

Probe Length = 2.59 m or 8.5 ft

Probe Weight = 6.80 kg or 15.0 lbs

Natural Gamma and Caliper can only be collected logging up hole.

Fluid Temperature/Resistivity can only be collected logging down hole.

Temperature Rating: 70 Deg C (158 Deg F)

Pressure Rating: 200 bar (2900 psi)

Natural Gamma Ray = 0.76 m (29.75 in)

**\*NOTE: Lengths on a particular tool may vary from those listed on this document due to probe sizes and styles utilized\***



————— **3-Arm Caliper = 1.44 m (56.75 in)**

**Distance from tool top: 2.20 m (86.5 in)**

**Available Arm Sizes: 3", 9", and 15"**

————— **TFR (Temperature/Fluid Resistivity) = 0.39 m (15.5 in)**

**1.375" or 34.9 mm Diameter**



**Southwest Exploration  
Services, LLC**

borehole geophysics & video services

Company FLORENCE COPPER

Well MW-01-LBF  
Field FLORENCE COPPER  
County PINAL  
State ARIZONA

**Final**

**E-Log Summary**



# Southwest Exploration Services, LLC

borehole geophysics & video services

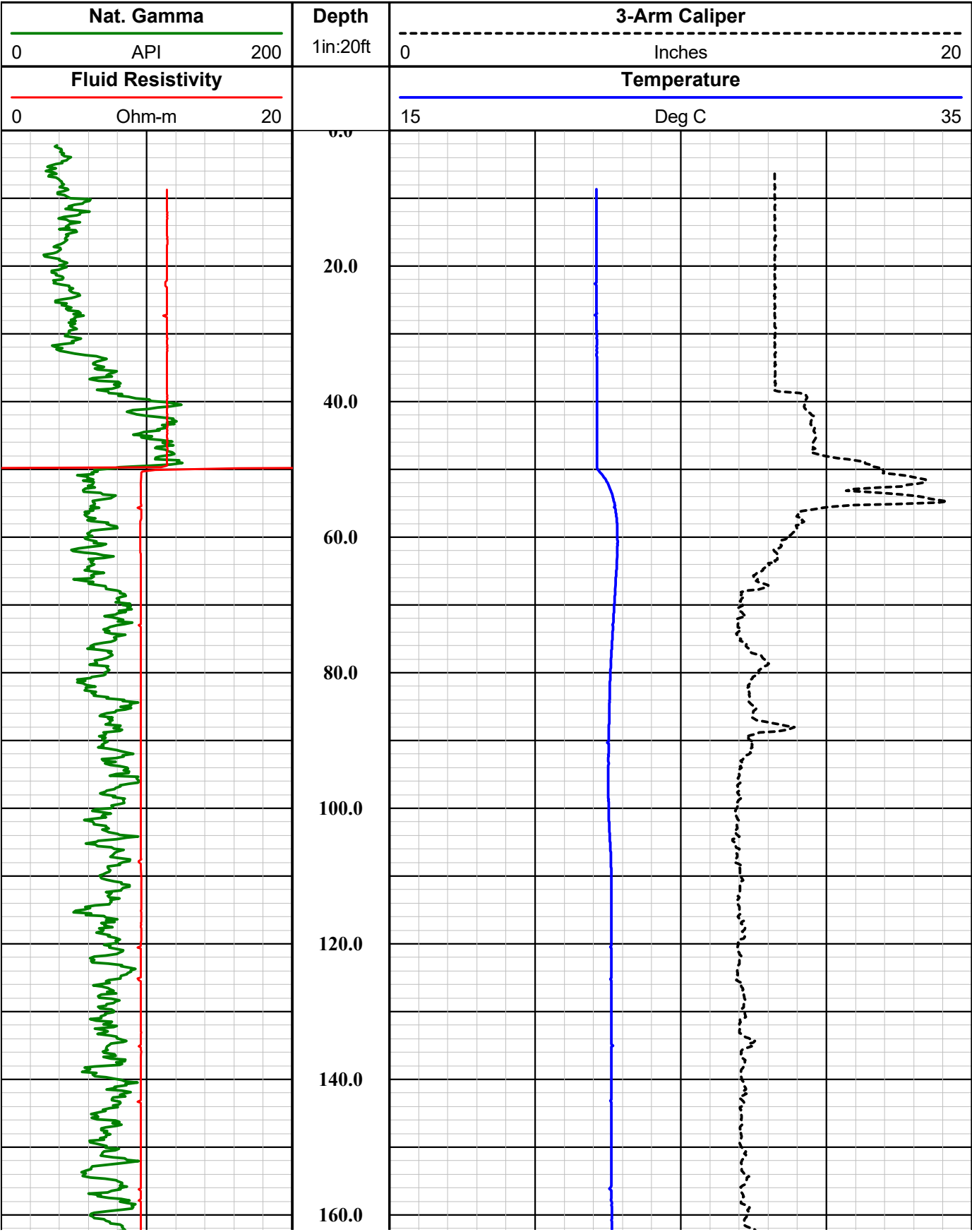
COMPANY FLORENCE COPPER									
WELL ID MW-01-LBF									
FIELD FLORENCE COPPER									
COUNTY PINAL STATE ARIZONA									
TYPE OF LOGS: GAMMA - CALIPER									
MORE: TEMP. / FLUID RES.									
LOCATION									
OTHER SERVICES E-LOG SONIC DEVIATION									
PERMANENT DATUM		SEC		TWP		RGE		K.B.	
LOG MEAS. FROM		GROUND LEVEL		ABOVE PERM. DATUM				D.F.	
DRILLING MEAS. FROM		GROUND LEVEL						G.L.	
DATE	12-18-17	TYPE FLUID IN HOLE		MUD					
RUN No	1	MUD WEIGHT		N/A					
TYPE LOG	GAMMA - CALIPER - TFR	VISCOSITY		N/A					
DEPTH-DRILLER	445 FT.	LEVEL		~ 49 FT.					
DEPTH-LOGGER	445 FT.	MAX. REC. TEMP.		22.83 DEG. C					
BTM LOGGED INTERVAL	445 FT.	IMAGE ORIENTED TO:		N/A					
TOP LOGGED INTERVAL	SURFACE	SAMPLE INTERVAL		0.2 FT.					
DRILLER / RIG#	STEWART BROTHERS	LOGGING TRUCK		TRUCK #200					
RECORDED BY / Logging Eng.	A. OLSON / M. QUINONES	TOOL STRING/SN		MSI COMBO TOOL SN 5543					
WITNESSED BY	ZACH - H&A	LOG TIME:ON SITE/OFF SITE		7:40 P.M.					
BOREHOLE RECORD									
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO		
1	7 IN.	SURFACE	20 FT.	14 IN.	STEEL	SURFACE	20 FT.		
2	12 1/4 IN.	20 FT.	TOTAL DEPTH						
3									
COMMENTS:									

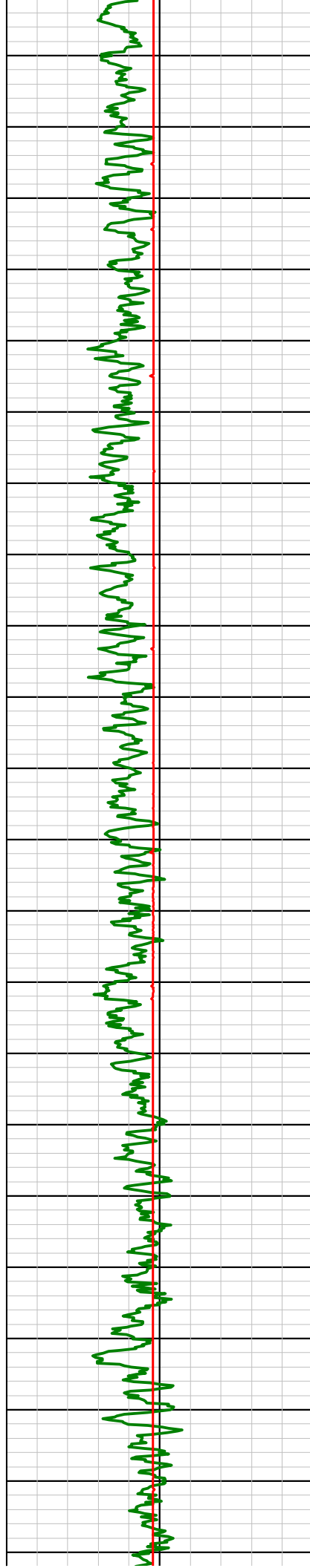
<b>Tool Summary:</b>					
Date	12-18-17	Date	12-18-17	Date	12-18-17
Run No.	1	Run No.	2	Run No.	3
Tool Model	MSI COMBO TOOL	Tool Model	MSI E-LOG 40GRP	Tool Model	MSI 60MM SONIC
Tool SN	5543	Tool SN	5019	Tool SN	5050
From	SURFACE	From	SURFACE	From	SURFACE
To	445 FT.	To	445 FT.	To	445 FT.
Recorded By	A. OLSON	Recorded By	A. OLSON	Recorded By	A. OLSON
Truck No	200	Truck No	200	Truck No	200
Operation Check	12-17-17	Operation Check	12-17-17	Operation Check	12-17-17
Calibration Check	12-17-17	Calibration Check	12-17-17	Calibration Check	N/A
Time Logged	8:35 P.M.	Time Logged	9:05 P.M.	Time Logged	9:30 P.M.
Date	12-18-17	Date		Date	
Run No.	4	Run No.	5	Run No.	6
Tool Model	MSI DEVIATION	Tool Model		Tool Model	
Tool SN	3082	Tool SN		Tool SN	
From	SURFACE	From		From	
To	445 FT.	To		To	
Recorded By	A. OLSON	Recorded By		Recorded By	
Truck No	200	Truck No		Truck No	
Operation Check	12-17-17	Operation Check		Operation Check	
Calibration Check	N/A	Calibration Check		Calibration Check	
Time Logged	10:15 P.M.	Time Logged		Time Logged	
<b>Additional Comments:</b>					
Caliper Arms Used: 15 IN.			Calibration Points: 8 IN. & 23 IN.		



**Disclaimer:**

All interpretations of log data are opinions based on inferences from electrical or other measurements. We do not guarantee the accuracy or correctness of any interpretations or recommendations and shall not be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our employees or agents. These interpretations are also subject to our general terms and conditions set out in our current Service Invoice.





180.0

200.0

220.0

240.0

260.0

280.0

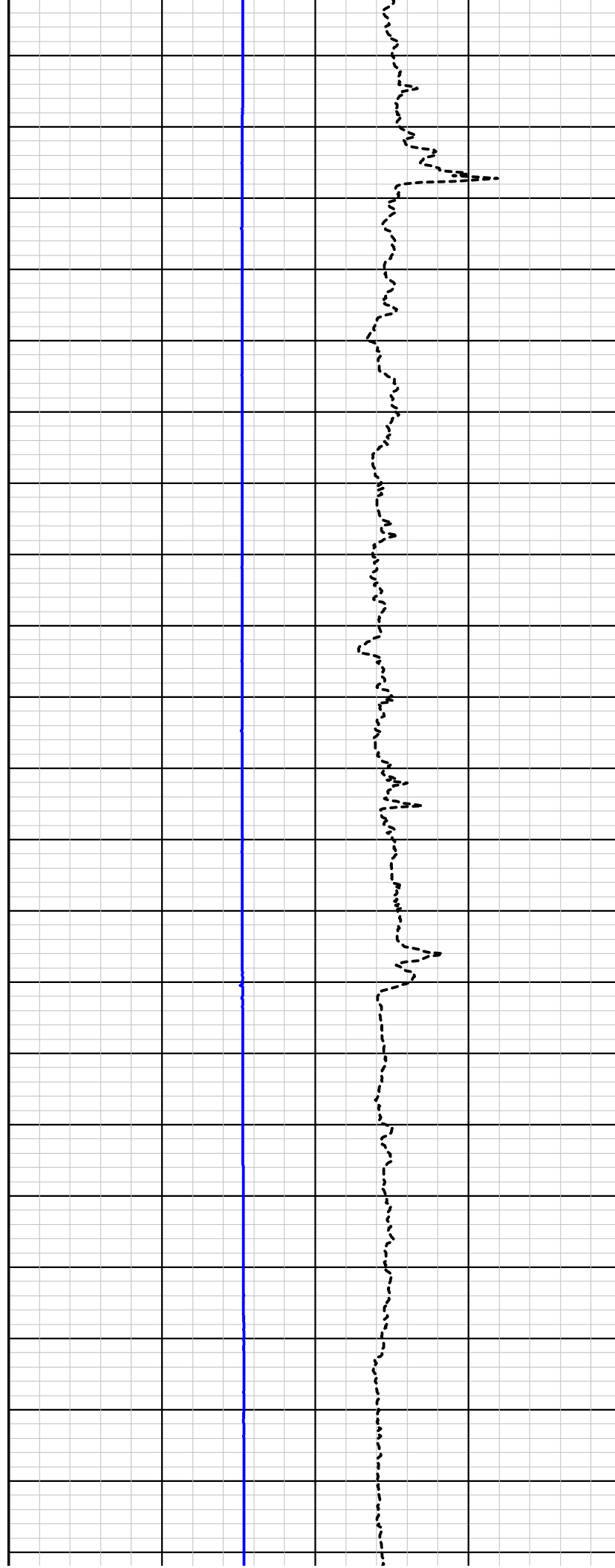
300.0

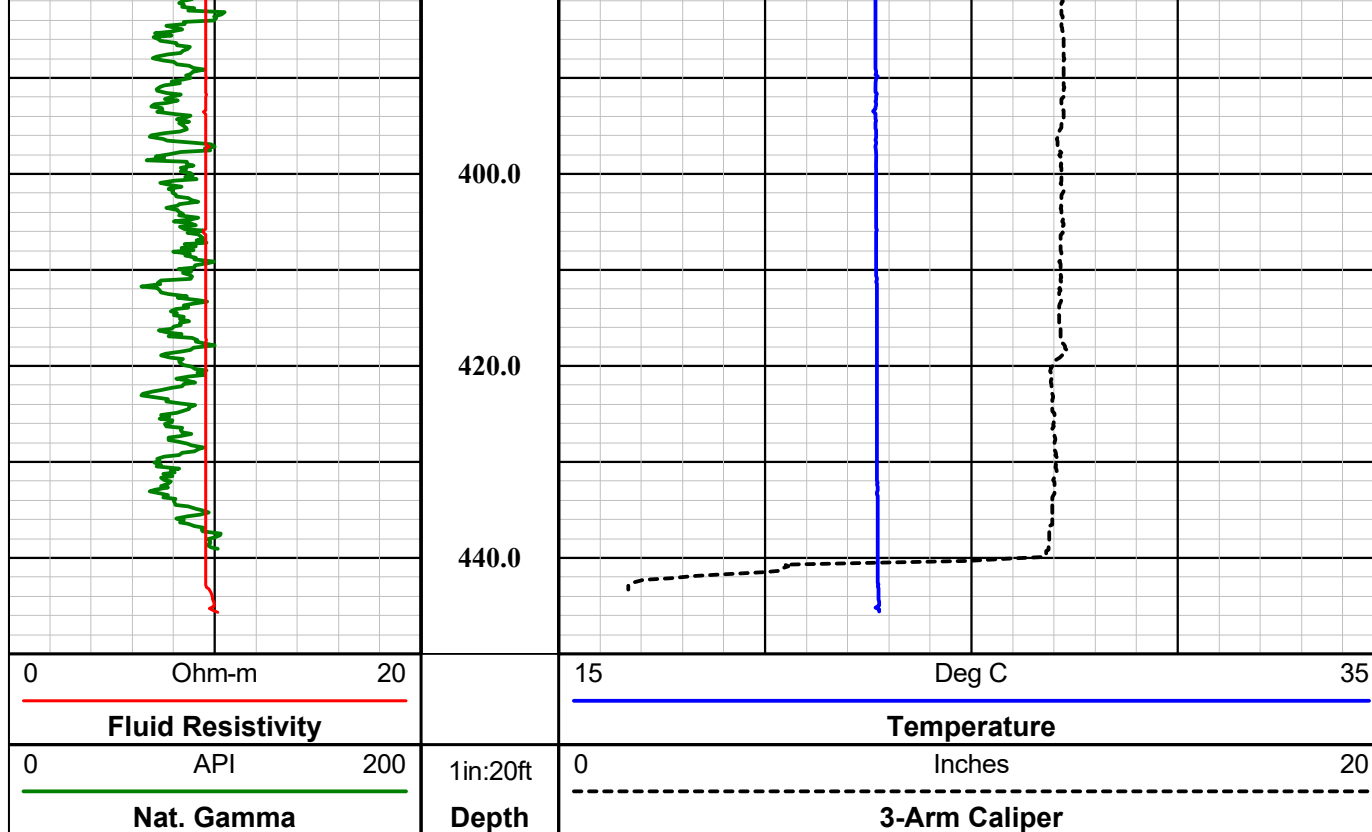
320.0

340.0

360.0

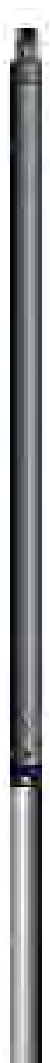
380.0





## MSI Gamma-Caliper-Temperature-Fluid Resistivity

Probe Top = Depth Ref.



Single Conductor MSI Probe Top

Probe Length = 2.59 m or 8.5 ft

Probe Weight = 6.80 kg or 15.0 lbs

Natural Gamma and Caliper can only be collected logging up hole.

Fluid Temperature/Resistivity can only be collected logging down hole.

Temperature Rating: 70 Deg C (158 Deg F)

Pressure Rating: 200 bar (2900 psi)

Natural Gamma Ray = 0.76 m (29.75 in)

**\*NOTE:** Lengths on a particular tool may vary from those listed on this document due to probe sizes and styles utilized\*



————— **3-Arm Caliper = 1.44 m (56.75 in)**

**Distance from tool top: 2.20 m (86.5 in)**

**Available Arm Sizes: 3", 9", and 15"**

————— **TFR (Temperature/Fluid Resistivity) = 0.39 m (15.5 in)**

**1.375" or 34.9 mm Diameter**



**Southwest Exploration  
Services, LLC**

borehole geophysics & video services

Company	FLORENCE COPPER
Well	MW-01-LBF
Field	FLORENCE COPPER
County	PINAL
State	ARIZONA

**Final**

**GCT Summary**



# Southwest Exploration Services, LLC

borehole geophysics & video services

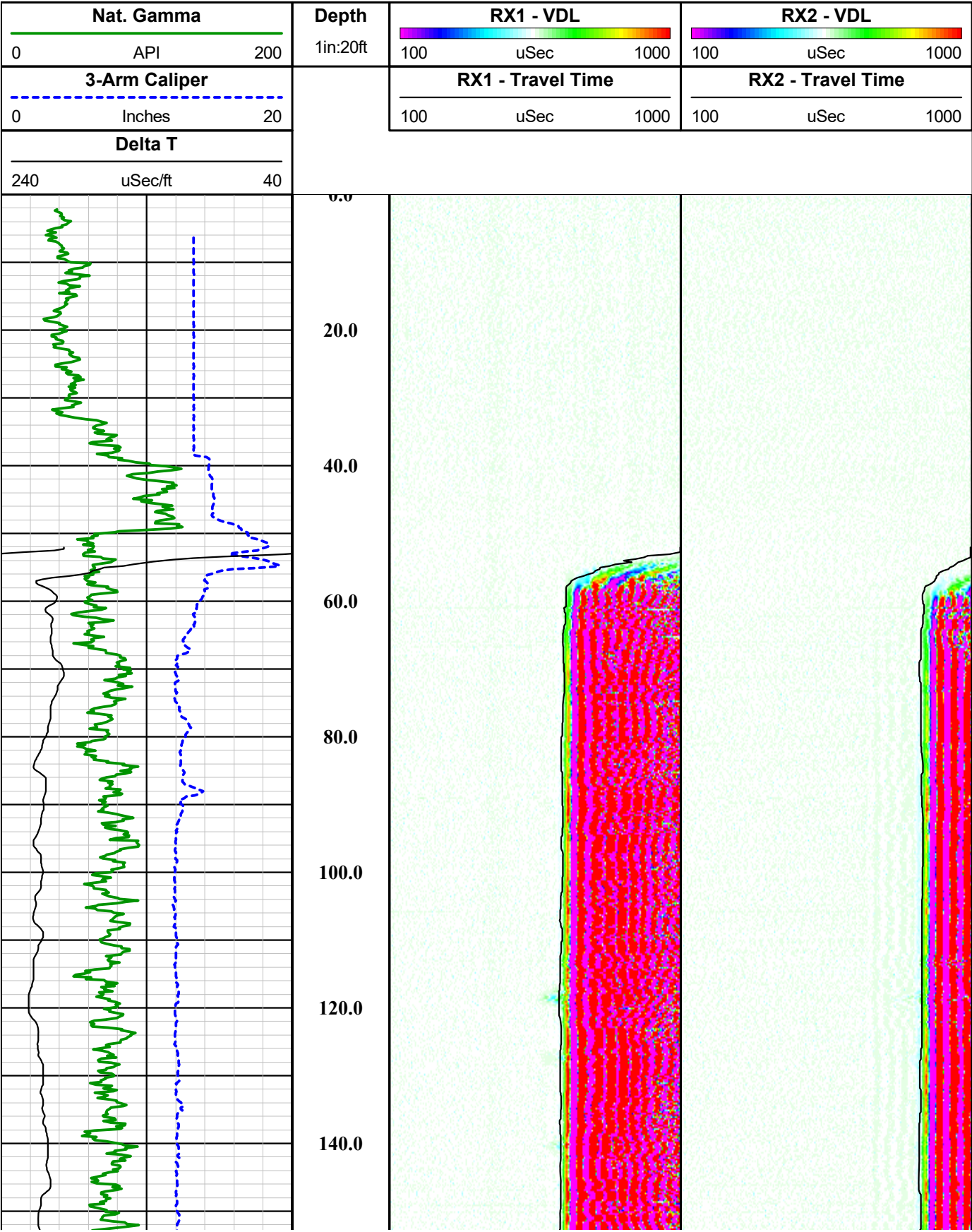
COMPANY FLORENCE COPPER							
WELL ID MW-01-LBF		FIELD FLORENCE COPPER					
COUNTY	PINAL	STATE ARIZONA					
TYPE OF LOGS: 60mm SONIC MORE: GAMMA - CALIPER		OTHER SERVICES E-LOG TEMPERATURE FLUID RESISTIVITY DEVIATION					
LOCATION							
SEC	TWP	RGE					
PERMANENT DATUM		ELEVATION					
LOG MEAS. FROM	GROUND LEVEL	ABOVE PERM. DATUM					
DRILLING MEAS. FROM	GROUND LEVEL	G.L.					
DATE	12-18-17	TYPE FLUID IN HOLE	MUD				
RUN No	1 & 3	MUD WEIGHT	N/A				
TYPE LOG	SONIC - GAMMA - CALIPER	VISCOSITY	N/A				
DEPTH-DRILLER	445 FT.	LEVEL	~ 49 FT.				
DEPTH-LOGGER	445 FT.	MAX. REC. TEMP.	22.83 DEG. C				
BTM LOGGED INTERVAL	445 FT.	IMAGE ORIENTED TO:	N/A				
TOP LOGGED INTERVAL	SURFACE	SAMPLE INTERVAL	0.25 FT.				
DRILLER / RIG#	STEWART BROTHERS	LOGGING TRUCK	TRUCK #200				
RECORDED BY / Logging Eng.	A. OLSON / M. QUINONES	TOOL STRING/SN	MSI 60mm SONIC SN 5050				
WITNESSED BY	ZACH - H&A	LOG TIME:ON SITE/OFF SITE	7:40 P.M.				
BOREHOLE RECORD		CASING RECORD					
NO.	BIT FROM	TO	SIZE	WGT.	FROM	TO	
1	7 IN.	SURFACE	20 FT.	14 IN.	STEEL	SURFACE	20 FT.
2	12 1/4 IN.	20 FT.	TOTAL DEPTH				
3							
COMMENTS:							

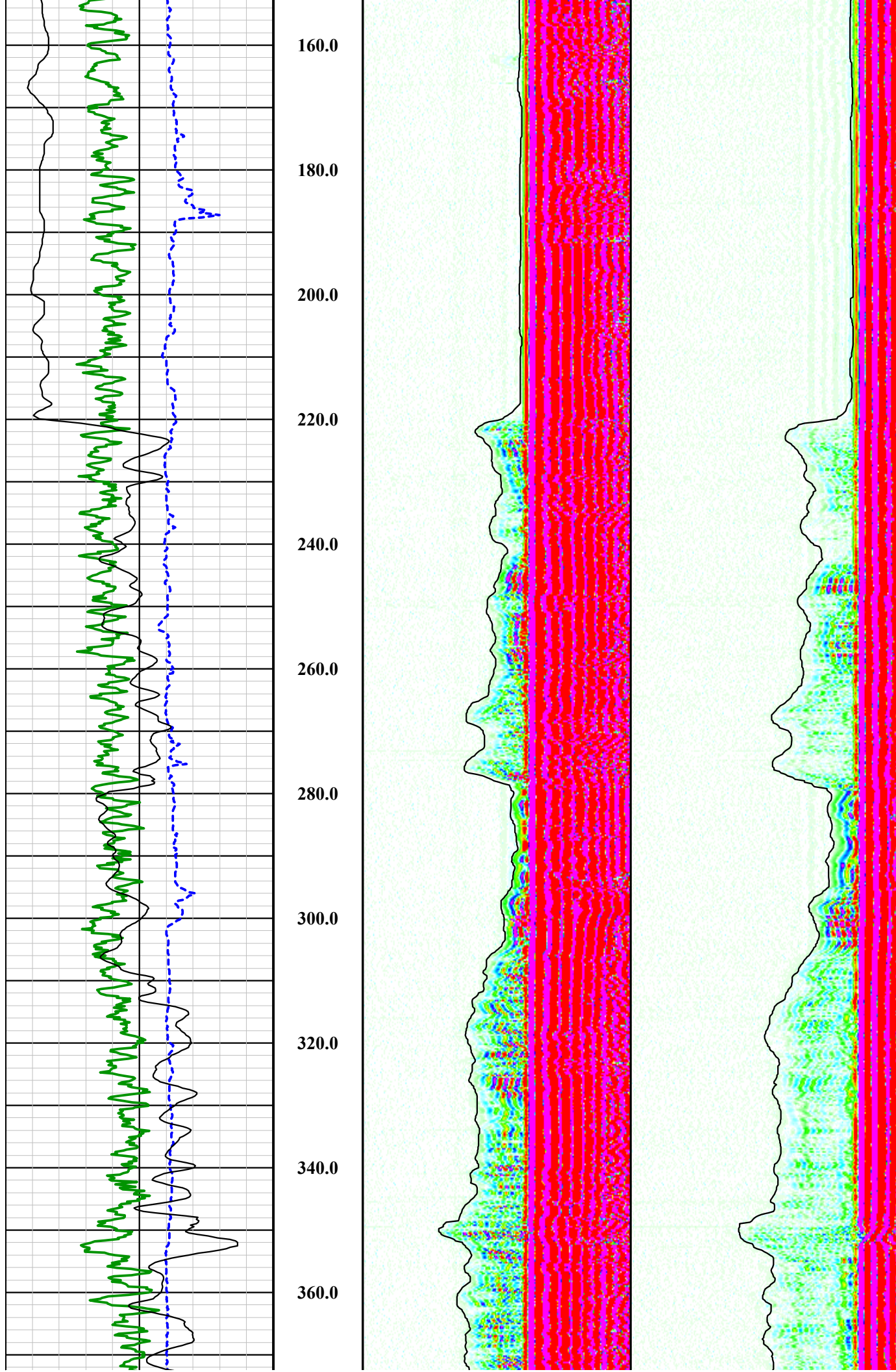
<b>Tool Summary:</b>					
Date	12-18-17	Date	12-18-17	Date	12-18-17
Run No.	1	Run No.	2	Run No.	3
Tool Model	MSI COMBO TOOL	Tool Model	MSI E-LOG 40GRP	Tool Model	MSI 60MM SONIC
Tool SN	5543	Tool SN	5019	Tool SN	5050
From	SURFACE	From	SURFACE	From	SURFACE
To	445 FT.	To	445 FT.	To	445 FT.
Recorded By	A. OLSON	Recorded By	A. OLSON	Recorded By	A. OLSON
Truck No	200	Truck No	200	Truck No	200
Operation Check	12-17-17	Operation Check	12-17-17	Operation Check	12-17-17
Calibration Check	12-17-17	Calibration Check	12-17-17	Calibration Check	N/A
Time Logged	8:35 P.M.	Time Logged	9:05 P.M.	Time Logged	9:30 P.M.
Date	12-18-17	Date		Date	
Run No.	4	Run No.	5	Run No.	6
Tool Model	MSI DEVIATION	Tool Model		Tool Model	
Tool SN	3082	Tool SN		Tool SN	
From	SURFACE	From		From	
To	445 FT.	To		To	
Recorded By	A. OLSON	Recorded By		Recorded By	
Truck No	200	Truck No		Truck No	
Operation Check	12-17-17	Operation Check		Operation Check	
Calibration Check	N/A	Calibration Check		Calibration Check	
Time Logged	10:15 P.M.	Time Logged		Time Logged	
<b>Additional Comments:</b>					
Caliper Arms Used: 15 IN. Calibration Points: 8 IN. & 23 IN.					



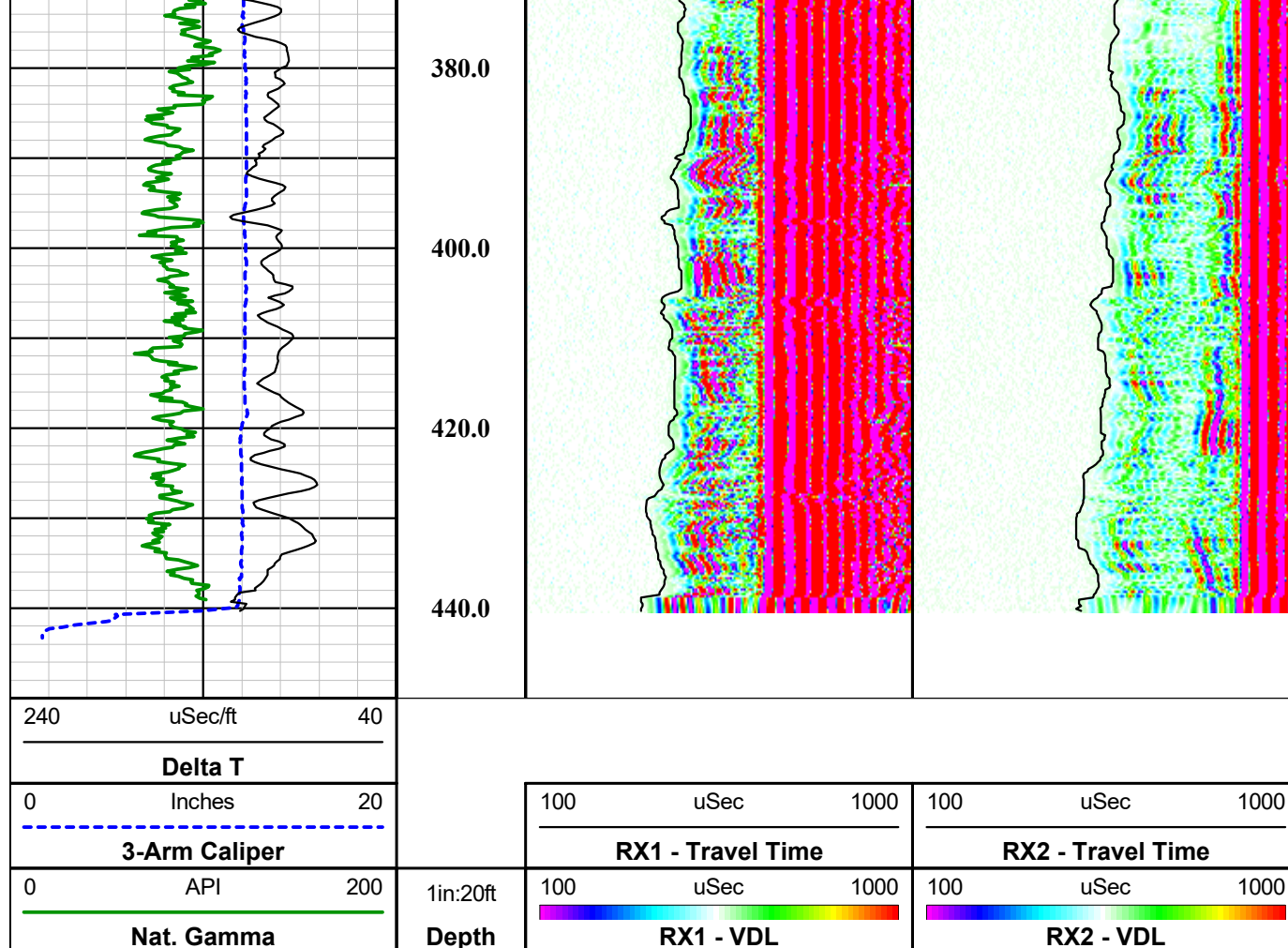
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## MSI 60 mm 2 RX Full Waveform Sonic Tool

Probe Top = Depth Ref.

Tool SN: 5001, 5050 & 6003



Four Conductor MSI Probe Top

Probe Length = 2.8 m or 9.19 ft  
Probe Weight = ~26.5 kg or 58.4 lbs

Sensors: Ceramic Piezoelectric

Transmitter Frequency: 24 - 28 kHz resonant frequency

Rx - Rx Spacing: 0.3 m (12.0 in)

Typically centralized with external centralizers

Can only be collected in fluid

Temperature Rating: 80 Deg C (176 Deg F)

Pressure Rating: 200 bar (2900 psi)

Rx-2 Tx - Rx2 Spacing = 1.22 m (48.0 in)



Rx-1 Tx - Rx1 Spacing = .91 m (36.0 in)

Acoustic Isolater

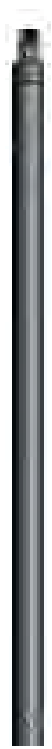
Tx = Acoustic Transmitter

0.660 m or 26.0 in. - End of tool to center of Tx

2.36 in or 60 mm Diameter

## MSI Gamma-Caliper-Temperature-Fluid Resistivity

Probe Top = Depth Ref.



Single Conductor MSI Probe Top

Probe Length = 2.59 m or 8.5 ft

Probe Weight = 6.80 kg or 15.0 lbs

Natural Gamma and Caliper can only be collected logging up hole.

Fluid Temperature/Resistivity can only be collected logging down hole.

Temperature Rating: 70 Deg C (158 Deg F)

Pressure Rating: 200 bar (2900 psi)

Natural Gamma Ray = 0.76 m (29.75 in)

**\*NOTE: Lengths on a particular tool may vary from those listed on this document due to probe sizes and styles utilized\***



————— **3-Arm Caliper = 1.44 m (56.75 in)**

**Distance from tool top: 2.20 m (86.5 in)**

**Available Arm Sizes: 3", 9", and 15"**

————— **TFR (Temperature/Fluid Resistivity) = 0.39 m (15.5 in)**

**1.375" or 34.9 mm Diameter**



**Southwest Exploration  
Services, LLC**

borehole geophysics & video services

Company FLORENCE COPPER

Well MW-01-LBF  
Field FLORENCE COPPER  
County PINAL  
State ARIZONA

**Final**

**Sonic Summary**



# *Drift Report*

## **Wellbore DRIFT Interpretation**

**PREPARED ESPECIALLY FOR**

**FLORENCE COPPER**

**MW-01-LBF**

**Monday - December 18, 2017**



This Wellbore Interpretation Package represents our best efforts to provide a correct interpretation. Nevertheless, since all interpretations are opinions based on inferences from electrical or other types of measurements, we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by Customer resulting from any interpretation made by this document. We do not warrant or guarantee the accuracy of the data, specifically including (but without limitations) the accuracy of data transmitted by electronic process, and we will not be responsible for accidental or intentional interception of such data by third parties. Our employees are not empowered to change or otherwise modify the attached interpretation. Furthermore, along with Eagle Pro Software we do not warrant or guarantee the accuracy of the programming techniques employed to produce this document. By accepting this Interpretation Package, the Customer agrees to the foregoing, and to our General Terms and Conditions.

**Southwest Exploration Services, LLC**  
**(480) 926-4558**

# WELLBORE DRIFT INTERPRETATION

Southwest Exploration Services, LLC

(480) 926-4558

Company:	FLORENCE COPPER			Well Owner:													
County:	PINAL	State:	Arizona		Country:	USA											
Well Number:	MW-01-LBF	Survey Date:	Monday - December 18, 2017		Magnetic Declination:	Declination Correction Not Used											
Field:	FLORENCE COPPER		Drift Calculation Methodology:			Balanced Tangential Method											
Location:																	
Remarks:																	
Witness:	ZACH - H&A	Vehicle No.:	200	Invoice No.:			Operator:	A. OLSON	Well Depth:	440 Feet	Casing size:	12.25 Inches					
Tool:	Compass - 3082		Lat.:			Long.:			Sec.:			Twp.:			Rge.:		

MEASURED DATA			DATA COMPUTATIONS						
DEPTHS, feet	INCLINATIONS, degrees	AZIMUTHS, degrees	TVD, feet	T. LATITUDE, feet	T. LONGITUDE, feet	DOGLEG SEV., degrees per 20 Feet	DOGLEG SEV., degrees per 100 feet	DRIFT DIST., feet	DRIFT BGR., degrees
0	0.56	358.92	0.00						
20	0.73	256.82	19.99	0.069	-0.126	1.00	3.77	0.14' (1.68")	298.60
40	0.30	155.44	39.98	-0.008	-0.228	0.41	3.75	0.23' (2.76")	268.10
60	0.05	114.64	59.97	-0.059	-0.198	0.96	1.69	0.21' (2.52")	253.40
80	0.06	000.34	79.96	-0.052	-0.190	0.84	4.07	0.20' (2.40")	254.60
100	0.09	197.03	99.96	-0.057	-0.195	0.42	4.80	0.20' (2.40")	253.80
120	0.06	127.13	119.95	-0.078	-0.191	0.13	2.78	0.21' (2.52")	247.70
140	0.32	158.86	139.94	-0.136	-0.163	0.43	1.33	0.21' (2.52")	230.00
160	0.19	143.19	159.93	-0.215	-0.123	0.83	0.66	0.25' (3.00")	209.80
180	0.00	123.87	179.92	-0.242	-0.103	0.95	0.81	0.26' (3.12")	203.10
200	0.07	274.34	199.91	-0.241	-0.115	0.37	4.69	0.27' (3.24")	205.50
220	0.38	177.34	219.90	-0.306	-0.124	1.00	3.63	0.33' (3.96")	202.10
240	0.43	186.52	239.89	-0.447	-0.129	1.00	0.39	0.47' (5.64")	196.20
260	0.26	120.47	259.88	-0.545	-0.098	0.34	2.64	0.55' (6.60")	190.20
280	0.30	111.55	279.87	-0.587	-0.010	0.93	0.38	0.59' (7.08")	181.00
300	0.18	181.10	299.86	-0.638	0.038	0.78	2.77	0.64' (7.68")	176.60
320	0.19	202.57	319.85	-0.700	0.025	0.53	0.90	0.70' (8.40")	178.00
340	0.27	142.09	339.84	-0.768	0.041	0.00	2.44	0.77' (9.24")	176.90

Page No. 1

True Vertical Depth: 439.79'

Final Drift Distance: 1.25' (15.00")

Final Drift Bearing: 166.00°

Note: Magnetic Declination is not used because it is not a factor in the calculation of well drift or alignment. Magnetic Declination is only important if attempting to hit a target or miss another well and then it is included in the calculations.

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Page No. 2

**Final Drift Distance: 1.25' (15.00")**

**Final Drift Bearing: 166.00°**

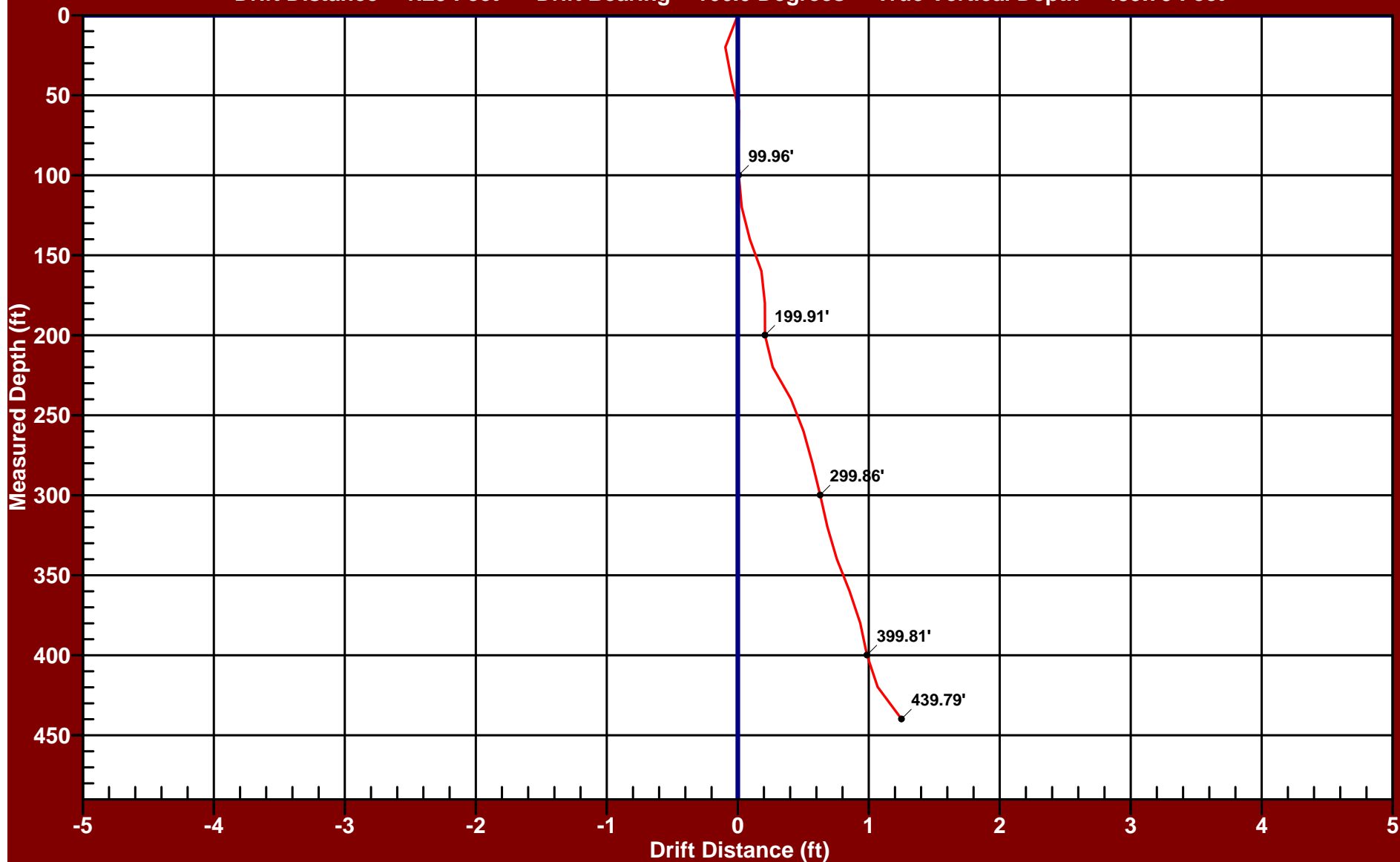
# PLANE OF DRIFT VIEW - MW-01-LBF

## FLORENCE COPPER

Drift Distance = 1.25 Feet

Drift Bearing = 166.0 Degrees

True Vertical Depth = 439.79 Feet



Date of Survey: Monday - December 18, 2017

Balanced Tangential Calculation Method

Southwest Exploration Services, LLC (480) 926-4558

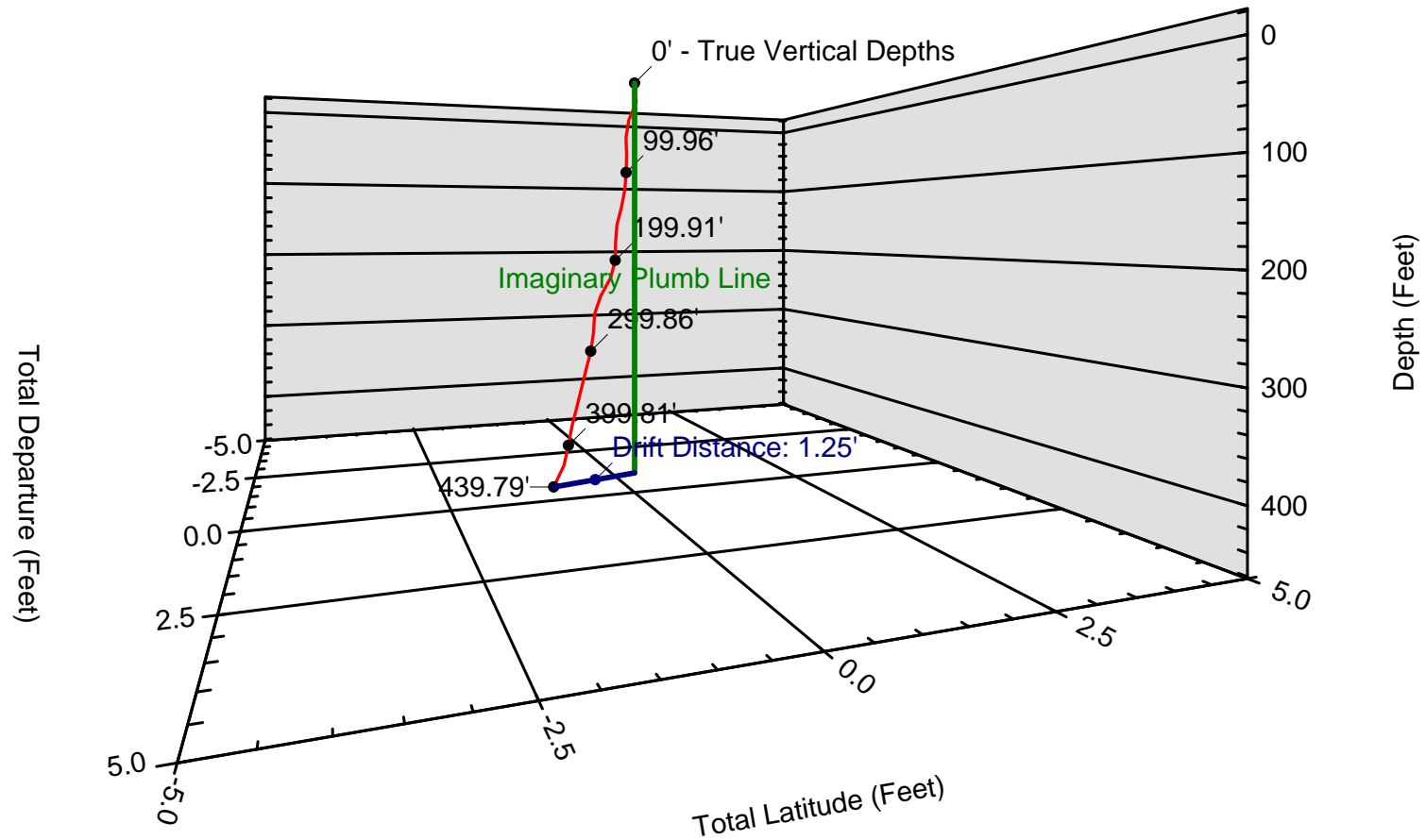
## FLORENCE COPPER

**Drift Distance = 1.25 Feet**

**Drift Bearing = 166.0 Degrees**

**True Vertical Depth = 439.79 Feet**

251.0



**Date of Survey: Monday - December 18, 2017**

### Balanced Tangential Calculation Method

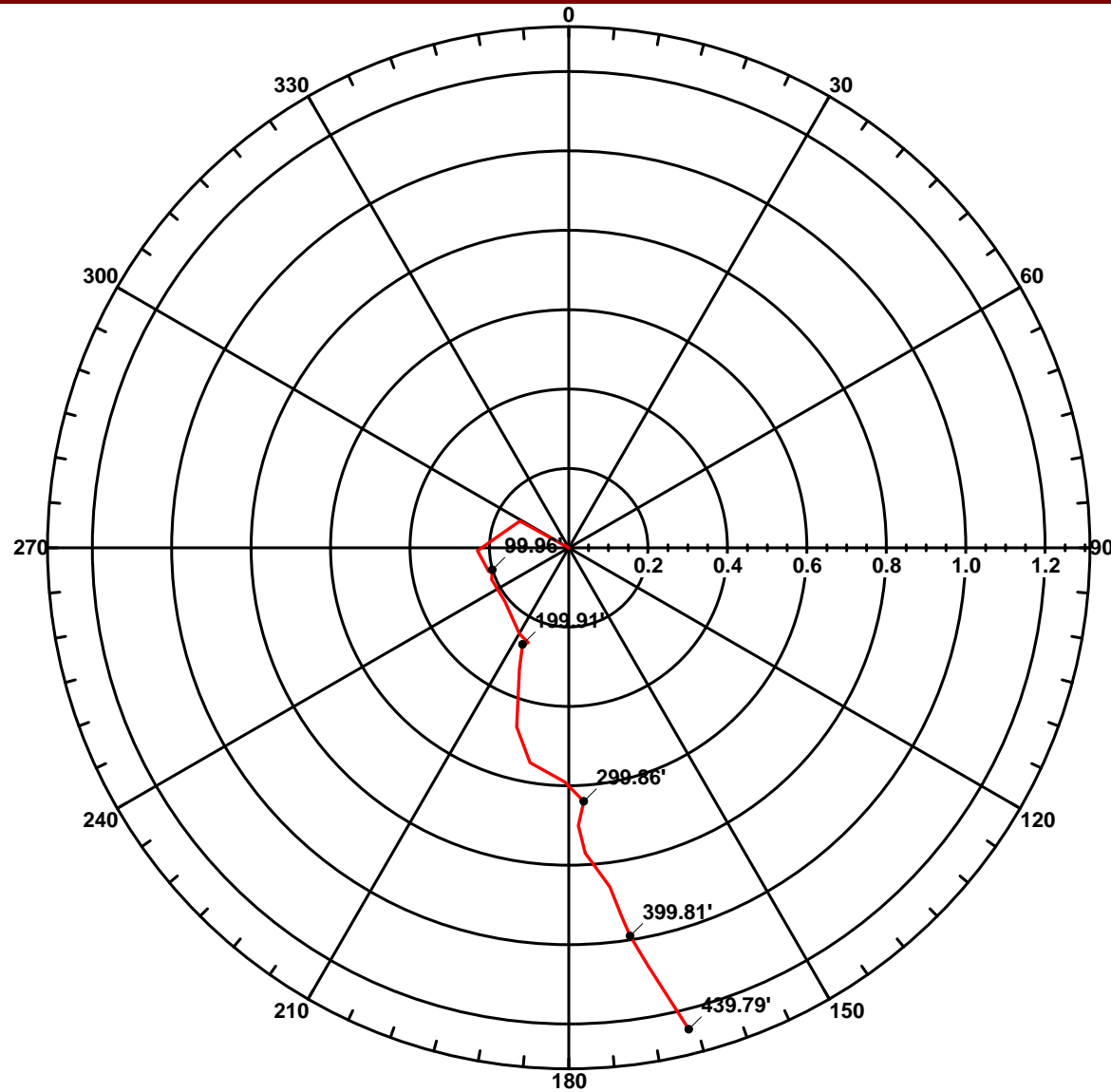
**Southwest Exploration Services, LLC (480) 926-4558**



# POLAR VIEW - MW-01-LBF

## FLORENCE COPPER

Drift Distance = 1.25 Feet    Drift Bearing = 166.0 Degrees    True Vertical Depth = 439.79 Feet



Date of Survey: Monday - December 18, 2017

Balanced Tangential Calculation Method

Southwest Exploration Services, LLC (480) 926-4558

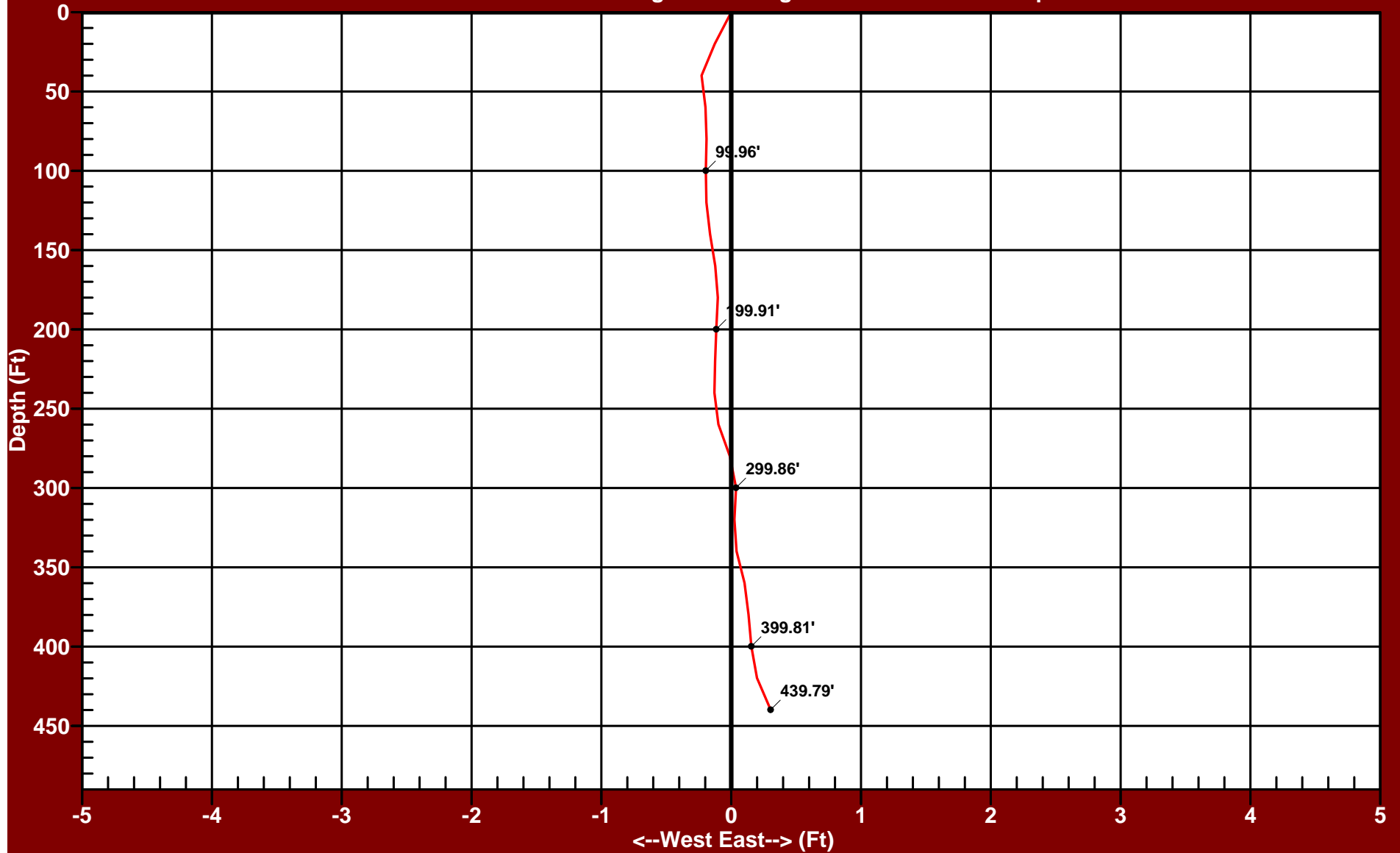
# EASTING RECTANGULAR VIEW - MW-01-LBF

## FLORENCE COPPER

Drift Distance = 1.25 Feet

Drift Bearing = 166.0 Degrees

True Vertical Depth = 439.79 Feet



Date of Survey: Monday - December 18, 2017

Balanced Tangential Calculation Method

Southwest Exploration Services, LLC (480) 926-4558

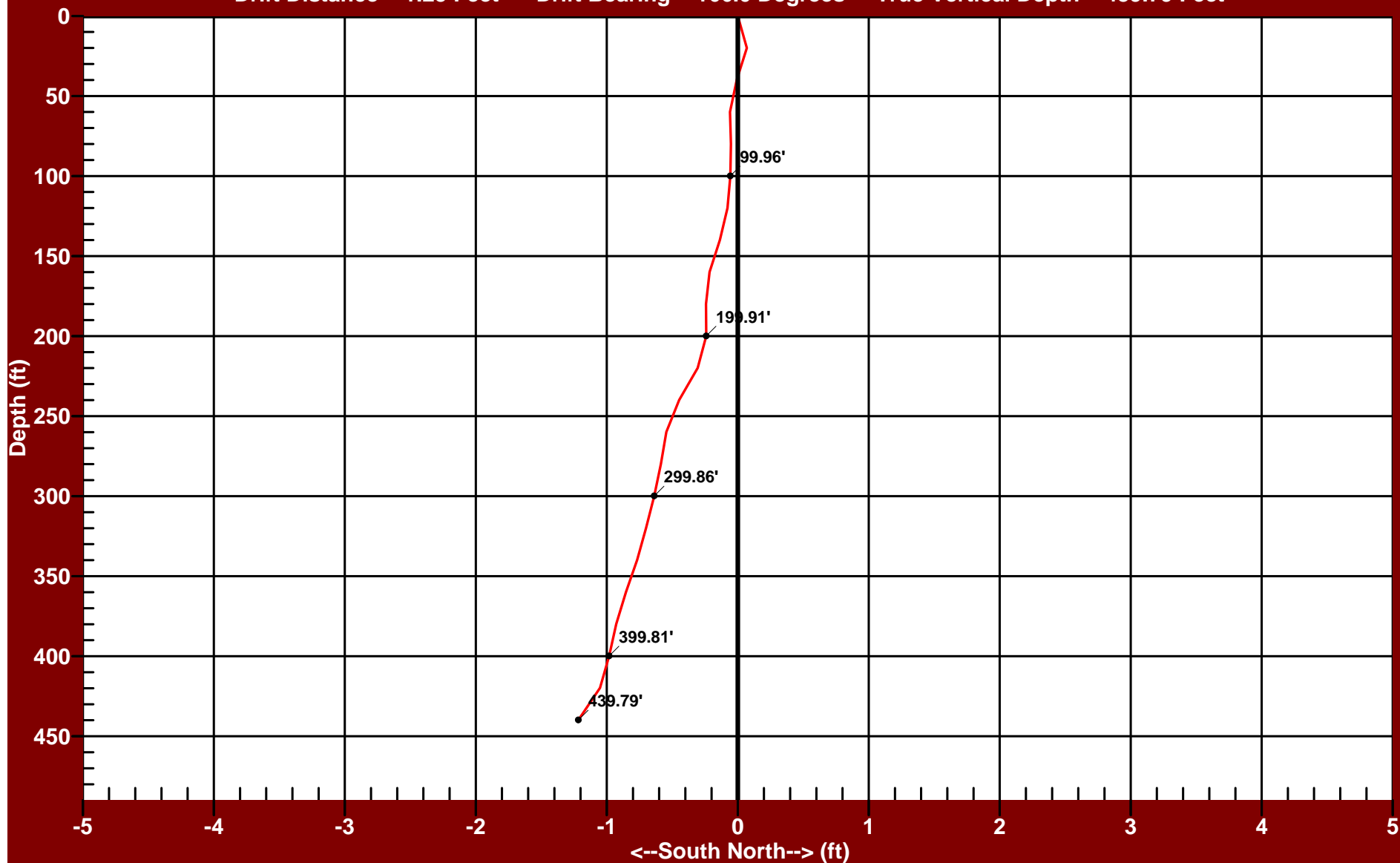
# NORTHING RECTANGULAR VIEW - MW-01-LBF

## FLORENCE COPPER

Drift Distance = 1.25 Feet

Drift Bearing = 166.0 Degrees

True Vertical Depth = 439.79 Feet



Date of Survey: Monday - December 18, 2017

Balanced Tangential Calculation Method

Southwest Exploration Services, LLC (480) 926-4558



# Southwest Exploration Services, LLC

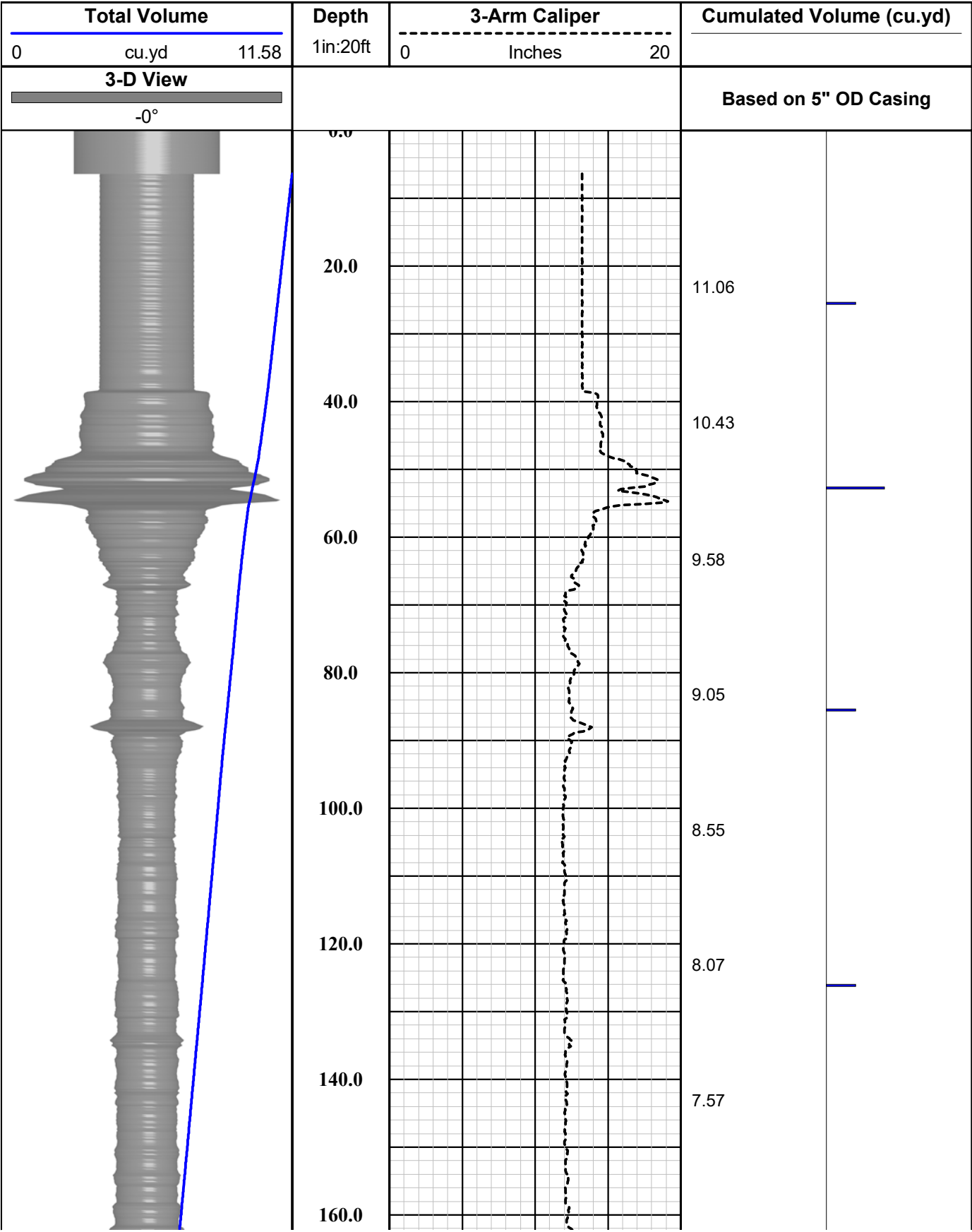
borehole geophysics & video services

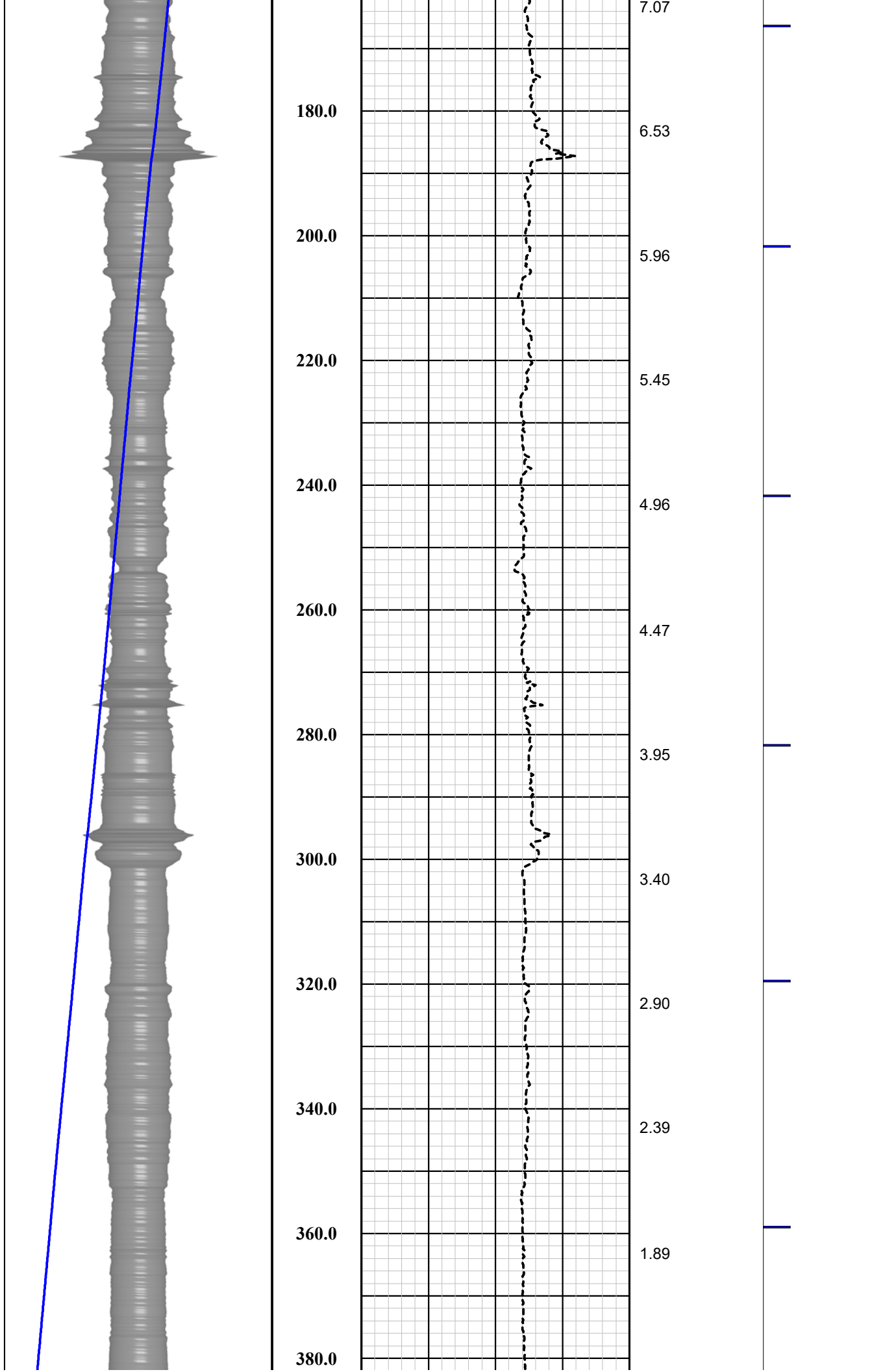
COMPANY FLORENCE COPPER									
WELL ID MW-01-LBF									
FIELD FLORENCE COPPER									
COUNTY PINAL STATE ARIZONA									
TYPE OF LOGS: 3-ARM CALIPER MORE: W/ VOLUME CALC.									
LOCATION									
OTHER SERVICES E-LOG SONIC DEVIATION									
PERMANENT DATUM		SEC		TWP		RGE		ELEVATION	
LOG MEAS. FROM		GROUND LEVEL		ABOVE PERM. DATUM		D.F.		K.B.	
DRILLING MEAS. FROM		GROUND LEVEL		G.L.		MUD		G.L.	
DATE		12-18-17		TYPE FLUID IN HOLE		MUD		MUD	
RUN No		1		MUD WEIGHT		N/A		N/A	
TYPE LOG		VOLUME CALCULATION		VISCOSITY		N/A		N/A	
DEPTH-DRILLER		445 FT.		LEVEL		~ 49 FT.		N/A	
DEPTH-LOGGER		445 FT.		MAX. REC. TEMP.		22.83 DEG. C		N/A	
BTM LOGGED INTERVAL		445 FT.		IMAGE ORIENTED TO:		N/A		N/A	
TOP LOGGED INTERVAL		SURFACE		SAMPLE INTERVAL		0.2 FT.		N/A	
DRILLER / RIG#		STEWART BROTHERS		LOGGING TRUCK		TRUCK #200		N/A	
RECORDED BY / Logging Eng.		A. OLSON / M. QUINONES		TOOL STRING/SN		MSI COMBO TOOL SN 5543		N/A	
WITNESSED BY		ZACH - H&A		LOG TIME:ON SITE/OFF SITE		7:40 P.M.		N/A	
BOREHOLE RECORD									
CASING RECORD									
NO.		BIT		FROM		TO		TO	
1		7 IN.		SURFACE		20 FT.		14 IN.	
2		12 1/4 IN.		20 FT.		TOTAL DEPTH		STEEL	
3									
COMMENTS:									

<b>Tool Summary:</b>					
Date	12-18-17	Date	12-18-17	Date	12-18-17
Run No.	1	Run No.	2	Run No.	3
Tool Model	MSI COMBO TOOL	Tool Model	MSI E-LOG 40GRP	Tool Model	MSI 60MM SONIC
Tool SN	5543	Tool SN	5019	Tool SN	5050
From	SURFACE	From	SURFACE	From	SURFACE
To	445 FT.	To	445 FT.	To	445 FT.
Recorded By	A. OLSON	Recorded By	A. OLSON	Recorded By	A. OLSON
Truck No	200	Truck No	200	Truck No	200
Operation Check	12-17-17	Operation Check	12-17-17	Operation Check	12-17-17
Calibration Check	12-17-17	Calibration Check	12-17-17	Calibration Check	N/A
Time Logged	8:35 P.M.	Time Logged	9:05 P.M.	Time Logged	9:30 P.M.
Date	12-18-17	Date		Date	
Run No.	4	Run No.	5	Run No.	6
Tool Model	MSI DEVIATION	Tool Model		Tool Model	
Tool SN	3082	Tool SN		Tool SN	
From	SURFACE	From		From	
To	445 FT.	To		To	
Recorded By	A. OLSON	Recorded By		Recorded By	
Truck No	200	Truck No		Truck No	
Operation Check	12-17-17	Operation Check		Operation Check	
Calibration Check	N/A	Calibration Check		Calibration Check	
Time Logged	10:15 P.M.	Time Logged		Time Logged	
<b>Additional Comments:</b>					
Caliper Arms Used: 15 IN.			Calibration Points: 8 IN. & 23 IN.		

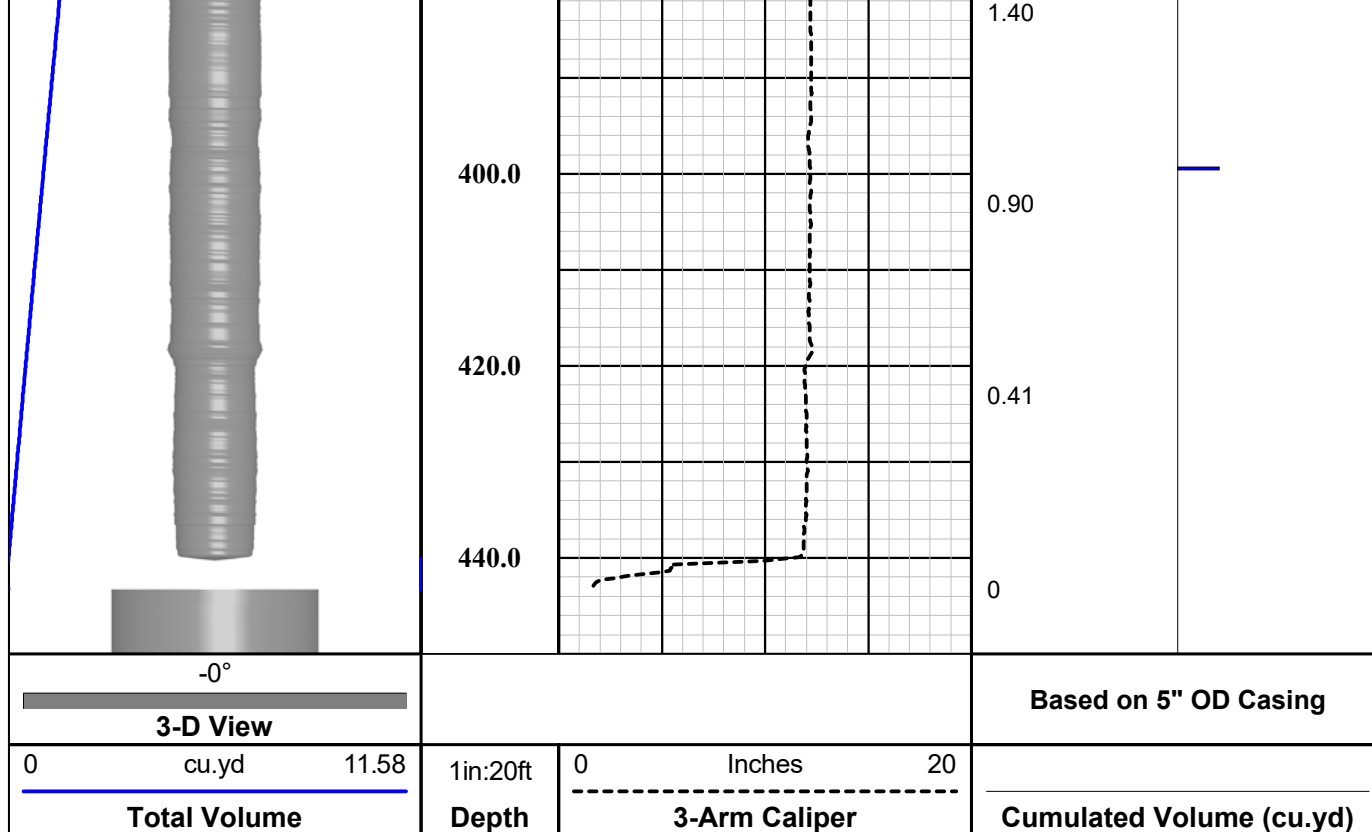
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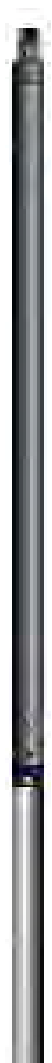






## MSI Gamma-Caliper-Temperature-Fluid Resistivity

Probe Top = Depth Ref.



Single Conductor MSI Probe Top

Probe Length = 2.59 m or 8.5 ft

Probe Weight = 6.80 kg or 15.0 lbs

Natural Gamma and Caliper can only be collected logging up hole.

Fluid Temperature/Resistivity can only be collected logging down hole.

Temperature Rating: 70 Deg C (158 Deg F)

Pressure Rating: 200 bar (2900 psi)

Natural Gamma Ray = 0.76 m (29.75 in)

**\*NOTE:** Lengths on a particular tool may vary from those listed on this document due to probe sizes and styles utilized\*



3-Arm Caliper = 1.44 m (56.75 in)

Distance from tool top: 2.20 m (86.5 in)

Available Arm Sizes: 3", 9", and 15"

TFR (Temperature/Fluid Resistivity) = 0.39 m (15.5 in)

1.375" or 34.9 mm Diameter



**Southwest Exploration  
Services, LLC**

borehole geophysics & video services

Company	FLORENCE COPPER
Well	MW-01-LBF
Field	FLORENCE COPPER
County	PINAL
State	ARIZONA

**Final**

**Caliper w / Volume Calculation Summary**



# Southwest Exploration Services, LLC

borehole geophysics & video services

COMPANY FLORENCE COPPER		WELL ID MW-01-LBF		FIELD FLORENCE COPPER		COUNTY PINAL		STATE ARIZONA	
TYPE OF LOGS: GAMMA - CALIPER		MORE: TEMP. / FLUID RES.		LOCATION		OTHER SERVICES SONIC 4 PI DENSITY DUAL DENSITY			
PERMANENT DATUM		SEC		TWP		RGE			
LOG MEAS. FROM		GROUND LEVEL		ELEVATION		K.B.			
DRILLING MEAS. FROM		GROUND LEVEL		ABOVE PERM. DATUM		D.F.			
DATE		1-31-18		TYPE FLUID IN HOLE		FORMATION WATER			
RUN No		1		MUD WEIGHT		N/A			
TYPE LOG		GAMMA - CALIPER - TFR		VISCOSITY		N/A			
DEPTH-DRILLER		437 FT.		LEVEL		~ 224 FT.			
DEPTH-LOGGER		437 FT.		MAX. REC. TEMP.		28.09 DEG. C			
BTM LOGGED INTERVAL		437 FT.		IMAGE ORIENTED TO:		N/A			
TOP LOGGED INTERVAL		SURFACE		SAMPLE INTERVAL		0.2 FT			
DRILLER / RIG#		HYDRO RESOURCES		LOGGING TRUCK		TRUCK #900			
RECORDED BY / Logging Eng.		A. OLSON / E. TURNER		TOOL STRING/SN		MSI COMBO TOOL, SN 5543			
WITNESSED BY		DIB - H&A		LOG TIME:ON SITE/OFF SITE		12:15 P.M.			
RUN		BOREHOLE RECORD		CASING RECORD					
NO.		BIT FROM		TO		SIZE		WGT.	
1		SURFACE		40 FT.		14 IN.		STEEL	
2		40 FT.		460 FT.		5 IN.		STEEL /PVC	
3									
COMMENTS:									

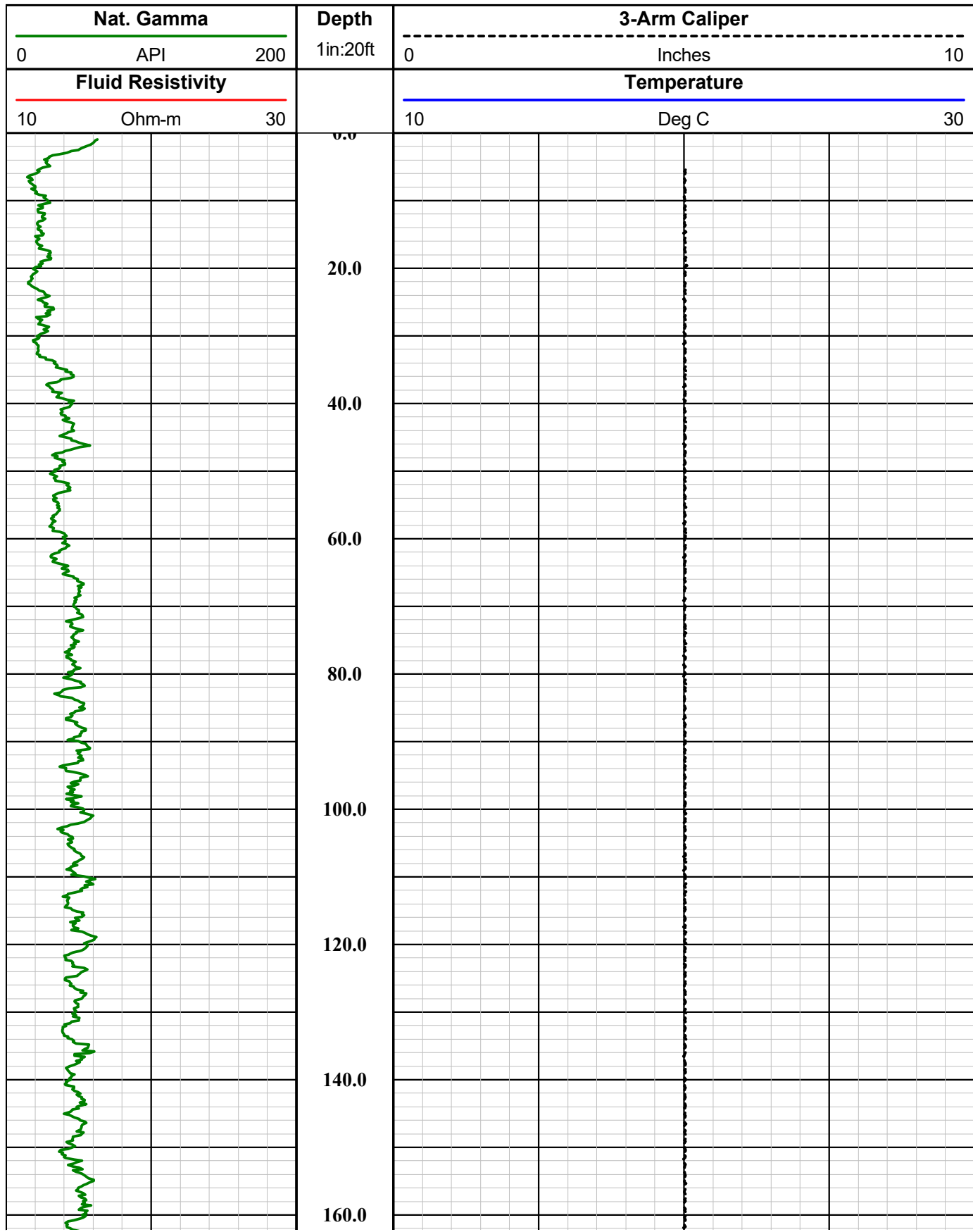
<b>Tool Summary:</b>					
Date	1-31-18	Date	1-31-18	Date	1-31-18
Run No.	1	Run No.	2	Run No.	3
Tool Model	MSI COMBO TOOL	Tool Model	ALT 4 RX SONIC	Tool Model	COMPROBE 4 PI
Tool SN	5543	Tool SN	4572	Tool SN	6009
From	SURFACE	From	200 FT.	From	SURFACE
To	437 FT.	To	437 FT.	To	437 FT.
Recorded By	A. OLSON	Recorded By	A. OLSON	Recorded By	A. OLSON
Truck No	900	Truck No	900	Truck No	900
Operation Check	1-30-18	Operation Check	1-30-18	Operation Check	1-30-18
Calibration Check	1-30-18	Calibration Check	N/A	Calibration Check	N/A
Time Logged	12:30 P.M.	Time Logged	1:15 P.M.	Time Logged	1:45 P.M.
Date	1-31-18	Date		Date	
Run No.	4	Run No.	5	Run No.	6
Tool Model	ALT QL DENSITY	Tool Model		Tool Model	
Tool SN	6187	Tool SN		Tool SN	
From	SURFACE	From		From	
To	437 FT.	To		To	
Recorded By	A. OLSON	Recorded By		Recorded By	
Truck No	900	Truck No		Truck No	
Operation Check	1-30-18	Operation Check		Operation Check	
Calibration Check	N/A	Calibration Check		Calibration Check	
Time Logged	2:10 P.M.	Time Logged		Time Logged	
<b>Additional Comments:</b>					
Caliper Arms Used: 9 IN.					
Calibration Points: 4 IN. & 12 IN.					

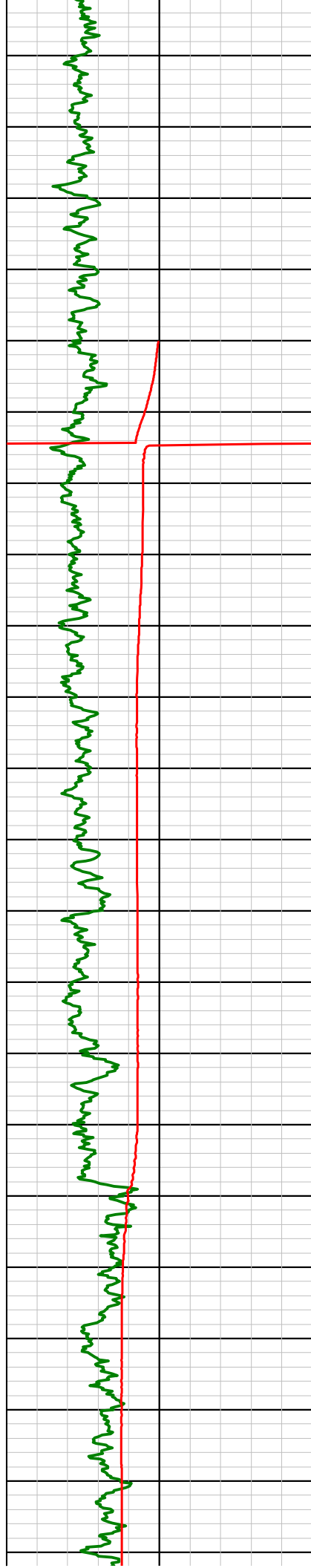
E-Log Calibration Range: N/A

Calibration Points: N/A

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180.0

200.0

220.0

240.0

260.0

280.0

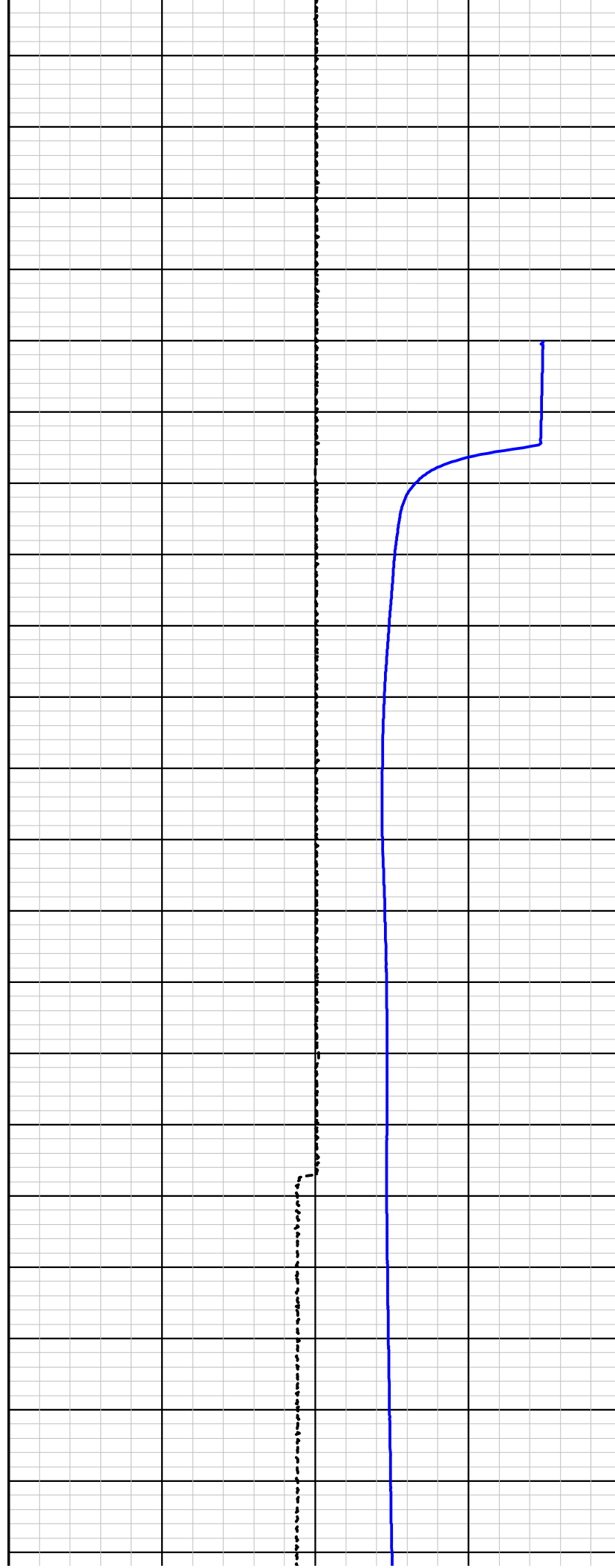
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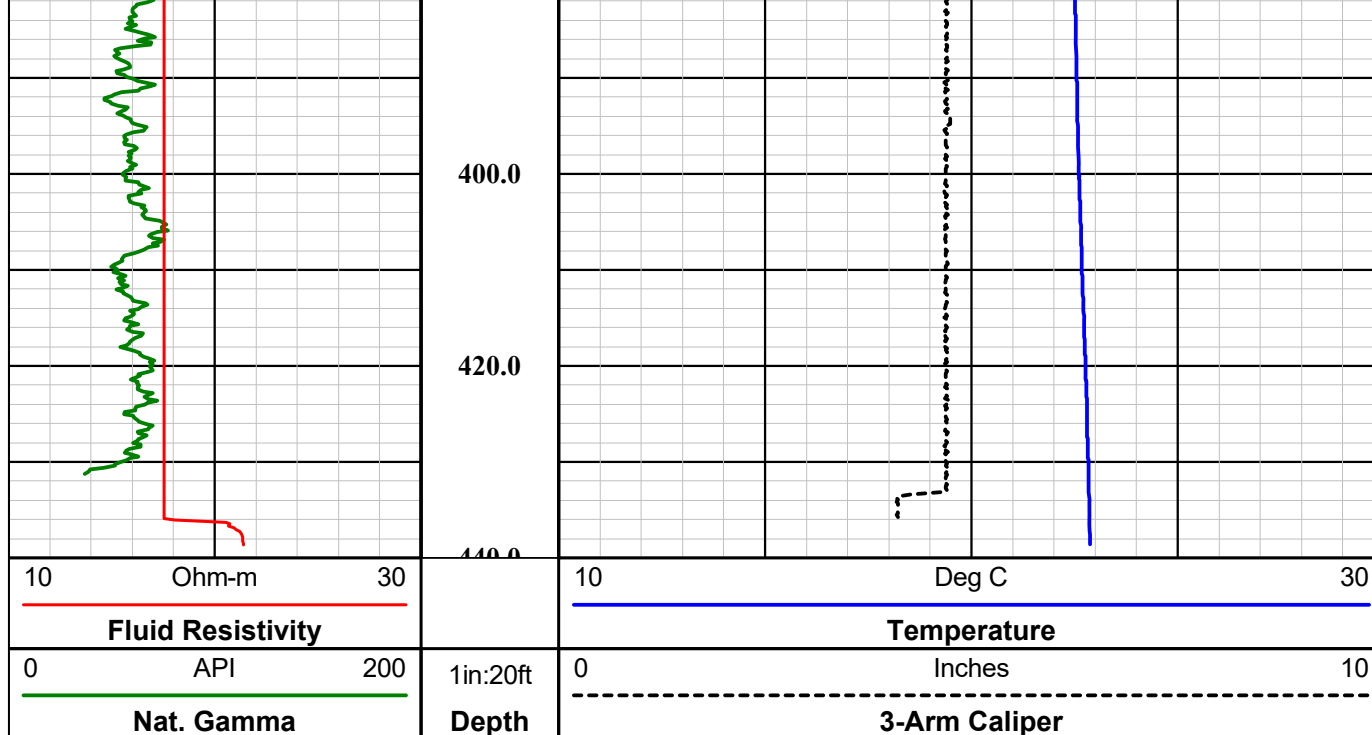
320.0

340.0

360.0

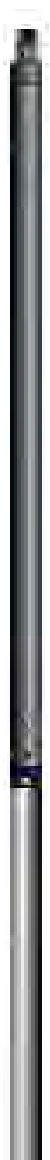
380.0





## MSI Gamma-Caliper-Temperature-Fluid Resistivity

Probe Top = Depth Ref.



Single Conductor MSI Probe Top

Probe Length = 2.59 m or 8.5 ft  
Probe Weight = 6.80 kg or 15.0 lbs

Natural Gamma and Caliper can only be collected logging up hole.

Fluid Temperature/Resistivity can only be collected logging down hole.

Temperature Rating: 70 Deg C (158 Deg F)  
Pressure Rating: 200 bar (2900 psi)

Natural Gamma Ray = 0.76 m (29.75 in)

**\*NOTE:** Lengths on a particular tool may vary from those listed on this document due to probe sizes and styles utilized\*

3-Arm Caliper = 1.44 m (56.75 in)



Distance from tool top: 2.20 m (86.5 in)

Available Arm Sizes: 3", 9", and 15"

———— TFR (Temperature/Fluid Resistivity) = 0.39 m (15.5 in)

1.375" or 34.9 mm Diameter



**Southwest Exploration  
Services, LLC**  
borehole geophysics & video services

Company	FLORENCE COPPER
Well	MW-01-LBF
Field	FLORENCE COPPER
County	PINAL
State	ARIZONA

**Final**

**GCT Summary**

## **APPENDIX F**

### **SAPT Documentation**

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
STANDARD ANNULAR PRESSURE TEST

Operator FLORENCE COPPER, INC

State Permit No. P-101704

Address 1575 W. HUNT HWY

USEPA Permit No. R9UIC-AZ3-FY11-1

FLORENCE, AZ 85132

Date of Test 2/01/2018

Well Name MW-01-LBF

Well Type ENV-MONITORING- Class III

**LOCATION INFORMATION**

SE Quarter of the NW Quarter of the SW Quarter of Section 28; Range 9E; Township 4S; County PINAL;

Company Representative IAN REAM; Field Inspector LAUREN CANDREVA;

Type of Pressure Gauge Pressure transducer with data logger inch face; 300 psi full scale; 0.001 psi increments;

New Gauge? Yes ☒ No ☐ If no, date of calibration            Calibration certification submitted? Yes ☐ No ☒

**TEST RESULTS**

Readings must be taken at least every 10 minutes for a minimum of 30 minutes for Class II, III and V wells and 60 minutes for Class I wells.

For Class II wells, annulus pressure should be at least 300 psig. For Class I wells, annulus pressure should be the greater of 300 psig or 100 psi above maximum permitted injection pressure.

Original chart recordings must be submitted with this form.

5-year or annual test on time? Yes ☐ No ☒

2-year test for TA'd wells on time? Yes ☐ No ☒

After rework? Yes ☐ No ☐

Newly permitted well? Yes ☒ No ☐

Time	Pressure (in psig)	
	Annulus	Tubing
13:10	134.16	same
13:20	128.06	same
13:30	122.15	same
13:40	116.53	same

Casing size 5" - NOMINAL

Tubing size 2"

Packer type INLFATABLE PACKER

Packer set @ 4.93(top), 296.09(bottom)

Top of Permitted Injection Zone 485 feet

Is packer 100 ft or less above top of

Injection Zone ? Yes ☐ No ☒ Monitor well - terminates above injection zone

If not, please submit a justification.

Fluid return (gal.) Not measured - failed test

Comments: Two tests conducted to confirm results, data for both tests included in attached chart and table

Test Pressures: Max. Allowable Pressure Change: Initial test pressure x 0.05 6.71 psi

Test Period Pressure change 17.63 psi

Test Passed ☐ Test Failed ☒

If failed test, well must be shut in, no injection can occur, and USEPA must be contacted within 24 hours. Corrective action needs to occur, the well retested, and written authorization received before injection can recommence.

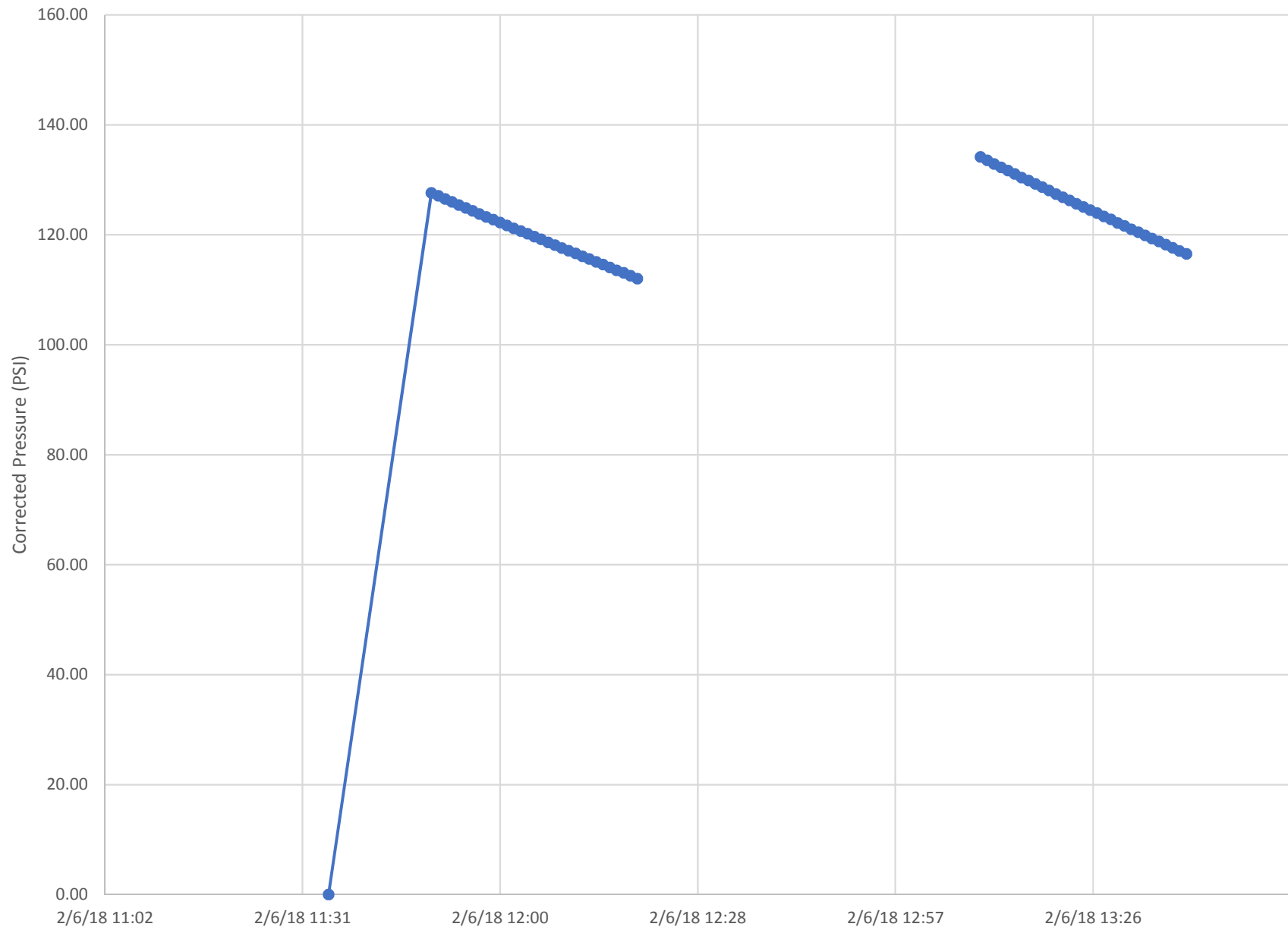
I certify under penalty of law that this document and all attachments are, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. (See 40 CFR 144.32(d))

Ian Ream  
Printed Name of Company Representative

[Signature]  
Signature of Company Representative

2-14-2018  
Date

MW01-LBF Standard Annular Pressure Test Data



Well MW01-LBF SAPT Data		
Tranducer Serial Number:	554227	
Tranducer Model:	Level TROLL 400 non-vented	300 psi
Date and Time	Pressure (PSI)	Corrected Pressure (PSI) (Sensor pressure - barometric pressure)
2/6/18 11:35	14.53	0.00
2/6/18 11:50	142.17	127.64
2/6/18 11:51	141.62	127.09
2/6/18 11:52	141.05	126.52
2/6/18 11:53	140.52	125.99
2/6/18 11:54	139.96	125.43
2/6/18 11:55	139.39	124.86
2/6/18 11:56	138.86	124.33
2/6/18 11:57	138.31	123.78
2/6/18 11:58	137.79	123.26
2/6/18 11:59	137.30	122.76
2/6/18 12:00	136.77	122.23
2/6/18 12:01	136.25	121.72
2/6/18 12:02	135.68	121.15
2/6/18 12:03	135.21	120.67
2/6/18 12:04	134.72	120.19
2/6/18 12:05	134.19	119.66
2/6/18 12:06	133.71	119.18
2/6/18 12:07	133.15	118.62
2/6/18 12:08	132.65	118.12
2/6/18 12:09	132.13	117.60
2/6/18 12:10	131.65	117.12
2/6/18 12:11	131.15	116.62
2/6/18 12:12	130.624	116.09
2/6/18 12:13	130.115	115.58
2/6/18 12:14	129.611	115.08
2/6/18 12:15	129.098	114.57
2/6/18 12:16	128.594	114.06
2/6/18 12:17	128.058	113.53
2/6/18 12:18	127.596	113.06
2/6/18 12:19	127.097	112.57
2/6/18 12:20	126.568	112.04
2/6/18 13:10	148.69	134.16
2/6/18 13:11	148.05	133.52
2/6/18 13:12	147.42	132.89
2/6/18 13:13	146.80	132.27
2/6/18 13:14	146.21	131.68
2/6/18 13:15	145.61	131.08
2/6/18 13:16	144.95	130.42
2/6/18 13:17	144.39	129.86
2/6/18 13:18	143.77	129.24

<b>Well MW01-LBF SAPT Data</b>		
Tranducer Serial Number:	554227	
Tranducer Model:	Level TROLL 400 non-vented	300 psi
Date and Time	Pressure (PSI)	Corrected Pressure (PSI) (Sensor pressure - barometric pressure)
2/6/18 13:19	143.19	128.66
2/6/18 13:20	142.59	128.06
2/6/18 13:21	141.94	127.41
2/6/18 13:22	141.36	126.83
2/6/18 13:23	140.76	126.23
2/6/18 13:24	140.17	125.64
2/6/18 13:25	139.61	125.08
2/6/18 13:26	139.02	124.49
2/6/18 13:27	138.46	123.93
2/6/18 13:28	137.85	123.32
2/6/18 13:29	137.35	122.82
2/6/18 13:30	136.68	122.15
2/6/18 13:31	136.14	121.61
2/6/18 13:32	135.54	121.01
2/6/18 13:33	134.98	120.44
2/6/18 13:34	134.42	119.89
2/6/18 13:35	133.85	119.32
2/6/18 13:36	133.30	118.77
2/6/18 13:37	132.75	118.22
2/6/18 13:38	132.16	117.63
2/6/18 13:39	131.60	117.07
2/6/18 13:40	131.06	116.53



## **APPENDIX G**

### **Cement Bond Log Summary**

WELL MW-01-LBF

Geophysical Log Summary

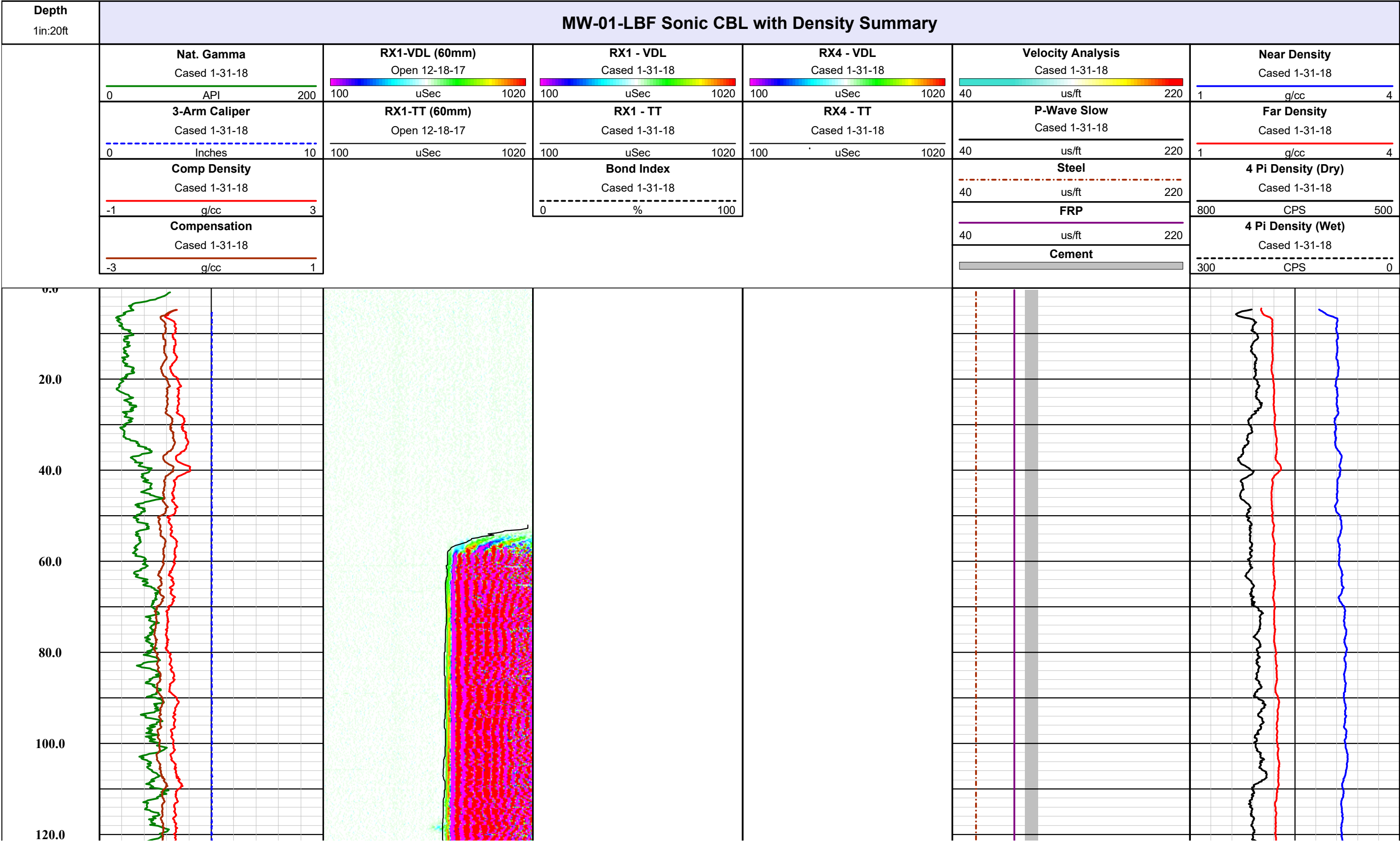


**Southwest Exploration Services, LLC**  
borehole geophysics & video services

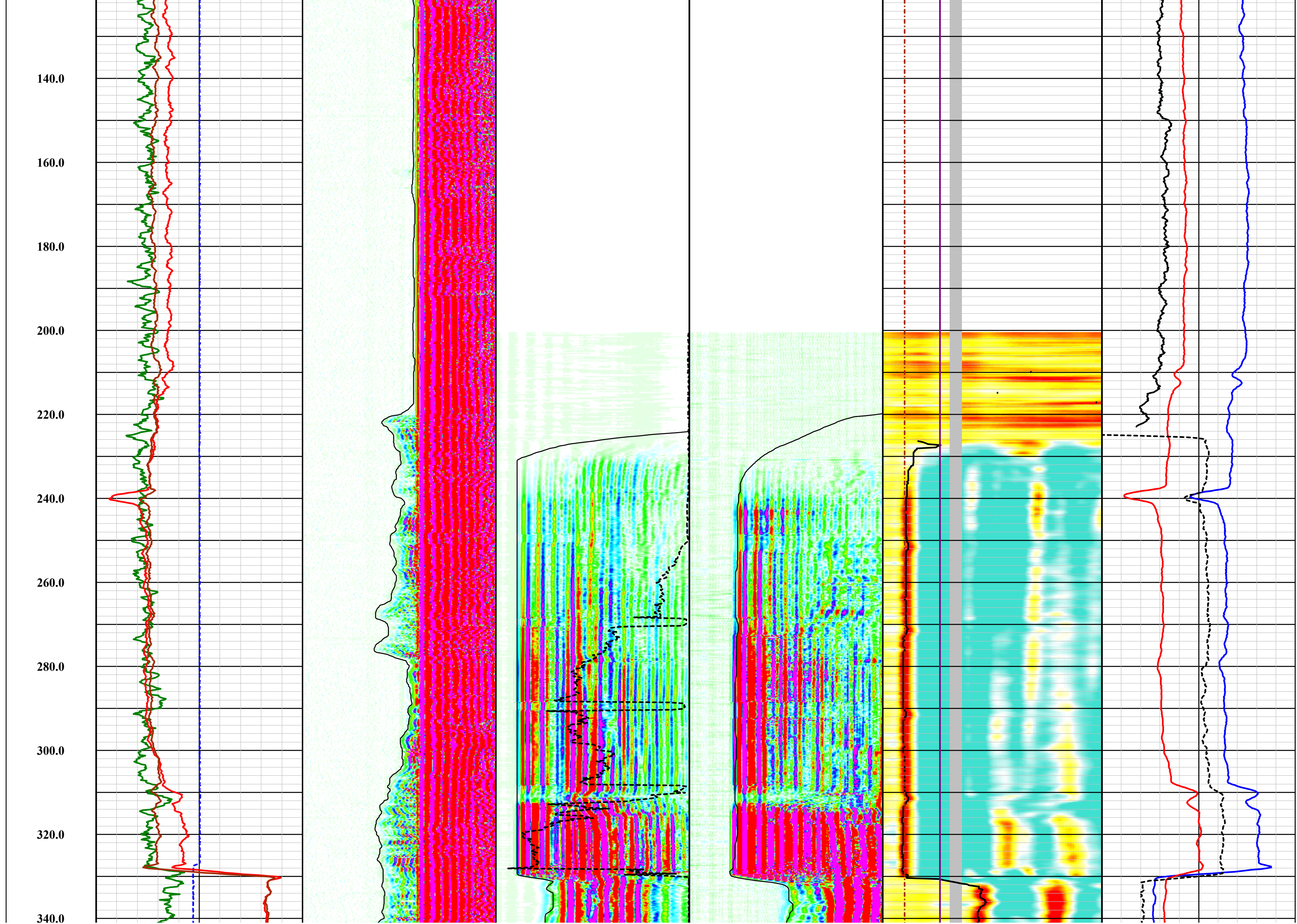


COMPANY: FLORENCE COPPER COMPANY  
FIELD: FLORENCE COPPER SITE  
WELL ID: MW-01-LBF  
COUNTY: PINAL STATE: ARIZONA

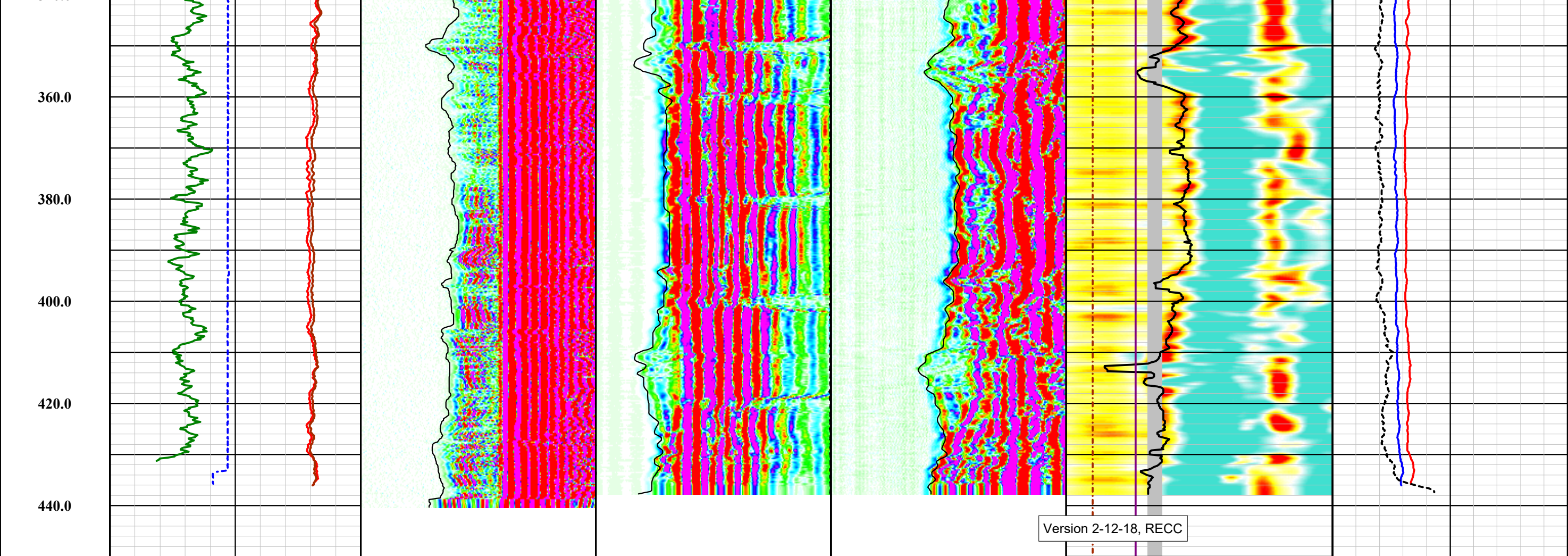
Logging Engineer: VARIOUS  
Date Logged: VARIOUS  
Processed By: K.M / B.C.  
Date Processed: 01-18-18











1in:20ft Depth	<div><div>-31g/cc1</div><div>Cased 1-31-18</div><div>Compensation</div></div>					<div><div>3000CPS</div><div>Cased 1-31-18</div><div>4 Pi Density (Wet)</div></div>
	<div><div>-13g/cc</div><div>Cased 1-31-18</div><div>Comp Density</div></div>					<div><div>800500CPS</div><div>Cased 1-31-18</div><div>4 Pi Density (Dry)</div></div>
	<div><div>010Inches</div><div>Cased 1-31-18</div><div>3-Arm Caliper</div></div>	<div><div>1001020uSec</div><div>Open 12-18-17</div><div>RX1-TT (60mm)</div></div>	<div><div>0100%100</div><div>Cased 1-31-18</div><div>Bond Index</div></div>	<div><div>1001020uSec</div><div>Cased 1-31-18</div><div>RX1 - TT</div></div>	<div><div>1001020uSec</div><div>Cased 1-31-18</div><div>RX4 - TT</div></div>	<div><div>40220us/ft</div><div>Cased 1-31-18</div><div>P-Wave Slow</div></div>
	<div><div>0200API</div><div>Cased 1-31-18</div><div>Nat. Gamma</div></div>	<div><div>1001020uSec</div><div>Open 12-18-17</div><div>RX1-VDL (60mm)</div></div>	<div><div>1001020uSec</div><div>Cased 1-31-18</div><div>RX1 - VDL</div></div>	<div><div>1001020uSec</div><div>Cased 1-31-18</div><div>RX4 - VDL</div></div>	<div><div>40220us/ft</div><div>Cased 1-31-18</div><div>Velocity Analysis</div></div>	<div><div>14g/cc</div><div>Cased 1-31-18</div><div>Near Density</div></div>
	MW-01-LBF Sonic CBL with Density Summary					

## **APPENDIX H**

### **Well Development Field Forms**

DEVELOPMENT  
FIELD DATA LOG

261

Project Name: <u>FCI</u>	Project No.:
Well No.: <u>MW-01-LBF</u>	Date: <u>12.21.17</u>
Location: <u>Florence, AZ</u>	Measuring Point: <u>L</u>
Total Depth of Well (ft bls): <u>440</u>	Screen Interval (ft bls): <u>330 - 440</u>
Pump Type/Setting (ft bls):	Activity: <u>AIRLIFT DEVELOPMENT</u>
How Q Measured:	H&A Personnel: <u>G. FOUSHEE, K. FORD</u>

Time	Discharge (gpm)	Pumping Water Level (ft)	Specific Capacity (gpm/ft)	Sand Content (ppm)	pH	Sp. Cond. (umhos/cm)	Temp. °C	Turbidity NTU	Comments
1037	UTM	UTM	→ 1210	CYCLE OFF		µS/cm			BEGIN AIRLIFT - 1210
1240	-1310	-ON							
1340	OFF.	CYCLE	for 30 min, 3000						
1500	RESET	PRESSURE TO 95	IT SEEMS						to produce continuously
1600	ATTEMPT	TURB. STILL OVER RANGE.							
1900	TURB	OVER RANGE.			8.96	0.0			Brown, cloudy.
2000	"	"	44		8.75	0.0			"
2100	"	"	44		8.88	0.0			"
2200	"	"	44		9.01	0.0			"
2300	"	"	44		8.85	0.0	11.7		"
2400	"	"	44		8.76	0.0	10.4		"
0100	"	"	44		8.94	0.0			"
0200	"	"	44		8.79	0.0			"
0300	"	"	44		8.80	0.0			"
0400			671	671	8.86	0.0		671	"
0500			924		8.65	0.0	7.3	924	"
0600					8.8	0.0	11.1	7999	- SHUT DOWN
0715	ON.							994	
0820									
0910					8.65	800	14.7	688	
1110								926	
1150					8.62			960	
1230				500	8.48	120	25.5	218	
1300				300	8.53	110	25.6	356	
1445					8.82	0.0	12.9	326	
1545					8.80	0.0	14.3	685	
1615					9.02	34	8.7	769	DRY IS, BACK ON
1645					8.93	0.0	14.3	7999	

12 23 a 10 gallons MUCK REMOVED. PUIZE HAND, NO SHUT-D.

Comments:



# DEVELOPMENT FIELD DATA LOG

Project Name: <u>FCI</u>	Project No.: <u>122687</u>
Well No.: <u>MW-01-LBF</u>	Date: <u>12/28/17</u>
Location: <u>Florence, AZ</u>	Measuring Point: <u>Discharge hose</u>
Total Depth of Well (ft bls): <u>440'</u>	Screen Interval (ft bls): <u>330-440</u>
Pump Type/Setting (ft bls): <u>420'</u>	Activity: <u>Development</u>
How Q Measured: <u>5 gal bucket</u>	H&A Personnel: <u>J. Hensel</u>

Time	Discharge (gpm)	Pumping Water Level (ft)	Specific Capacity (gpm/ft)	Sand Content (ppm)	pH	Sp. Cond. (umhos/cm)	Temp. °C	Turbidity NTU	Comments
650									Pump on
715	~60	-	-	0.1	7.74	1.411	19.5	92.2	Brown, cloudy
715	"	-	-	0.1	7.42	1.382	20.8	18.6	"
730	"	-	-	0.0	7.30	1.392	19.9	89.8	cloudy, tan
745	"	-	-	0.0	7.22	1.390	20.9	88.2	"
800	"	-	-	0.0	7.21	1.384	20.3	89.9	"
820	"	-	-	0.0	7.15	1.387	20.6	91.2	"
830	"	-	-	0.0	7.13	1.361	21.2	55.1	"
845	"	-	-	0.0	7.11	1.376	20.8	56.4	"
900	"	-	-	0.0	7.11	1.375	20.7	51.7	"
905	"	-	-	0.0	7.10	1.374	20.7	37.4	"
930	"	-	-	0.0	7.09	1.358	21.6	37.0	"
932									Pump off to move discharge hose
945									Pump on
950	~60	-	-	0.0	7.09	1.367	22.4	142	cloudy, brown
1000	"	-	-	0.0	7.11	1.367	22.7	77.4	cloudy, tan
1015									Pump shut itself off
1035									Pump on
1045	~60	"	-	0.0	7.10	1.389	22.8	98.9	cloudy, tan
1100									Pump turned itself off again
1105									Pump on
1115	~60	-	-	0.0	7.08	1.363	22.8	51.8	cloudy, tan
1130	"	-	-	0.0	7.07	1.360	22.8	35.1	"
1145	"	-	-	0.0	7.10	1.366	23.0	32.6	"
1200	"	-	-	0.0	7.09	1.370	23.1	21.2	"
1215	"	-	-	0.0				19.9	clear
									Pump off to move discharge hose
									Pump on

Comments:

# DEVELOPMENT FIELD DATA LOG

Project Name: FLI	Project No.: 124687
Well No.: MW-01-LBF	Date: 12/28/17 - 12/29/17
Location: Florence, AZ	Measuring Point: Discharge hose
Total Depth of Well (ft bls): 440'	Screen Interval (ft bls): 330' - 440'
Pump Type/Setting (ft bls): 420'	Activity: Development
How Q Measured: 5 gal bucket	H&A Personnel: S. Hensel













Time	Discharge (gpm)	Pumping Water Level (ft)	Specific Capacity (gpm/ft)	Sand Content (ppm)	pH	Sp. Cond. (µmhos/cm)	Temp. °C	Turbidity NTU	Comments
1245	~60	-	-	0.0	7.05	1.377	22.9	28.7	clear
1310	"	-	-	0.0	7.01	1.369	23.8	17.7	clear
1330	"	-	-	0.0	7.06	1.377	24.2	17.3	clear
1350	"	-	-	0.0	7.05	1.378	22.9	16.1	clear
1420	"	-	-	-	-	-	-	12.5	clear / collect sample
1500	-	-	-	-	-	-	-	-	Pump off
1600	~60	-	-	-	-	-	-	-	Pump on
1600	-	-	-	-	-	-	-	-	Pump off
1645	~60	-	-	-	-	-	-	-	Pump on
1115	~60	-	-	0.0	7.04	1.369	22.8	7.14	clear
1200	"	-	-	0.0	7.06	1.370	22.7	2.72	clear
1205	-	-	-	-	-	-	-	-	Pump off
1300	~60	-	-	-	-	-	22.9	-	Pump on
1530	"	-	-	0.0	7.04	1.372	8.32	8.32	clear
1635	"	-	-	0.0	7.04	1.375	22.6	3.12	clear
1545	-	-	-	-	-	-	-	-	Pump off
1605	~60	-	-	0.0	-	-	-	-	Pump on
1635	"	-	-	0.0	7.06	1.373	22.7	11.14	clear
1705	"	-	-	0.0	7.05	1.371	22.6	5.69	clear
1700	-	-	-	0	-	-	-	-	Pump off
1120	~60	-	-	0.0	7.05	1.371	22.5	-	CLEAR
1135	"	-	-	0.0	7.06	1.371	22.6	-	CLEAR
1200	"	-	-	0.0	7.05	1.371	22.5	-	CLEAR
1210	-	-	-	-	-	-	-	-	PUMP OFF = BEGIN PULLING

Comments:

## **APPENDIX I**

### **Well Video Log**

Client:	<b>Florence Copper</b>	Survey Date:	<b>February 09, 2018</b>
Address:	<b>1575 West Hunt Hwy</b>	Invoice:	<b>8234</b> Run: <b>1</b>
City:	<b>Florence</b> State: <b>AZ</b> Zip: <b>85132</b>	Well Name:	<b>MW-01-LBF</b>
Requested By:	<b>Florence Copper</b> P.O.:	Well Owner:	<b>Florence Copper</b>
Copy To:		Camera:	<b>CCV S.S. Color Camera - Ring of Lights</b>
Purpose:	<b>General Inspection</b>	Zero Datum:	<b>Top of Casing</b>
Location:		Depth:	<b>438 ft.</b> Vehicle: <b>290</b>
Field:	<b>Florence Copper Project</b>	Type Perfs:	<b>Horizontal Slots</b>
1st Csg I.D.:	<b>5 In.</b> Csg Weight:	From:	<b>0 ft.</b> To: <b>331 ft.</b>
2nd Csg I.D.:	<b>5 In.</b> Csg Weight:	From:	<b>331 ft.</b> To: <b>438 ft.</b>
Standing Water Level:	<b>227.04 ft.</b> Pumping Water Level:	Pump Depth:	
I.D.Ref:	<b>Measured</b> Casing Buildup:	<b>None</b>	
Operator:	<b>D. Beam</b> Lat.:	Long.:	
Sec:		Twp:	
Rge:			

Other Information:		True Depths:	
Wellbore Snapshots		(SideScan-Feet)	WELLBORE / CASING INFORMATION
0 Ft (See Other Side)	10.1 Ft (See Other Side)	0.	Survey started at the top of the casing.
		10.1	First joint inside the casing.
		69.1	Top view of a joint above water.
		90.1	Side view of a joint above the water level.
69.1 Ft (See Other Side)	90.1 Ft (See Other Side)	226.1	View of the casing just above the water level.
		227.	Static water level observed.
		240.1	Side view just below water level.
226.1 Ft (See Other Side)	227 Ft (See Other Side)	331.1	Joint leading into perforations.
		332.1	First perforations observed.
		365.	View of suspended particulates in the well.
		423.	View of the perforations just before the bottom of the well.
240.1 Ft (See Other Side)	331.1 Ft (See Other Side)	438.	Bottom of the well observed, end of survey.
			
332.1 Ft (See Other Side)	365 Ft (See Other Side)		
			
423 Ft (See Other Side)	438 Ft (See Other Side)		
			

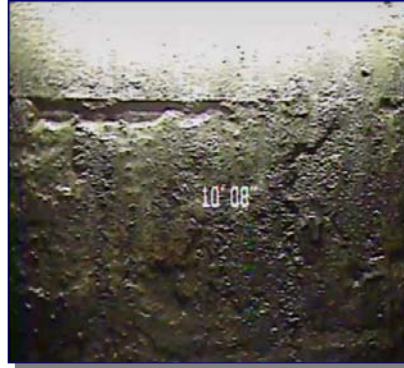
Notes:

## 12 WELLBORE SHAPSHOTS

0 Ft (Enlargement)



10.1 Ft (Enlargement)



69.1 Ft (Enlargement)



90.1 Ft (Enlargement)



226.1 Ft (Enlargement)



227 Ft (Enlargement)



240.1 Ft (Enlargement)



331.1 Ft (Enlargement)



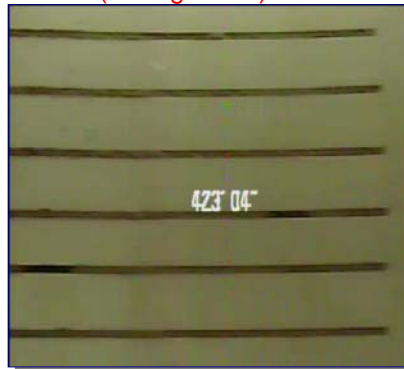
332.1 Ft (Enlargement)



365 Ft (Enlargement)



423 Ft (Enlargement)



438 Ft (Enlargement)

